United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
West Virginia Agricultural
and Forestry Experiment
Station

Soil Survey of Clay County, West Virginia

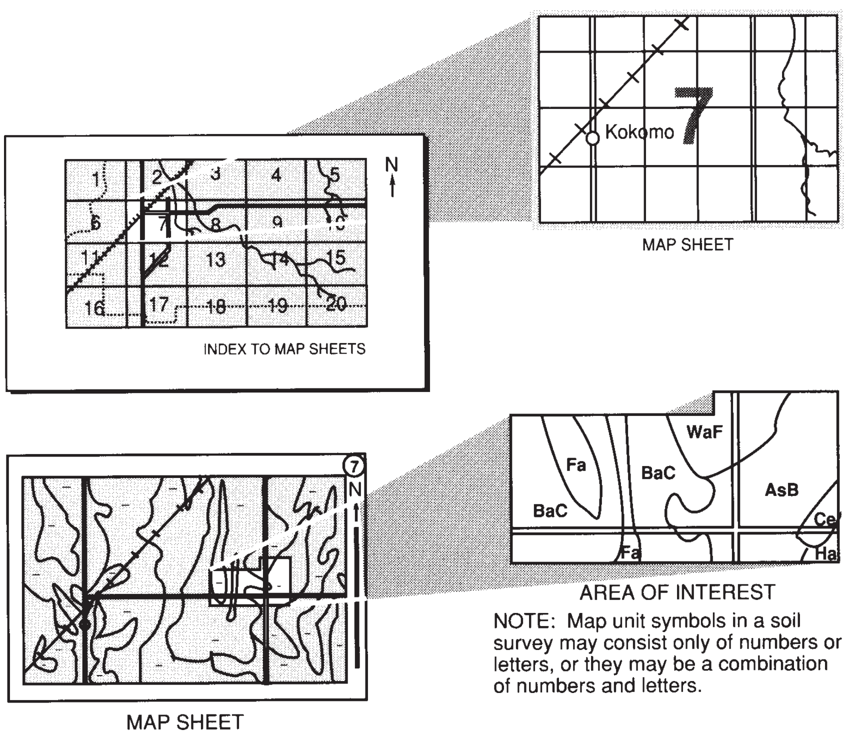
How To Use This Soil Survey

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and go to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Go to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1997. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1997. This survey was made cooperatively by the Natural Resources Conservation Service and the West Virginia Agricultural and Forestry Experiment Station. The survey is part of the technical assistance furnished to the Elk Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: This mosaic of meadows on ridgetops and woodlands on side slopes near Varneytown illustrates a typical land use pattern in Clay County. Gilpin and Lily soils are on the ridges, and Pineville-Gilpin-Laidig association, very steep, extremely stony, is on the side slopes.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

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Issued October 2005

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Ronald L. Hilliard
State Conservationist
Natural Resources Conservation Service

Soil Survey of Clay County, West Virginia

By Anthony Jenkins, Natural Resources Conservation Service

Fieldwork by Anthony Jenkins, Charles Delp, and Robert N. Pate,
Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources
Conservation Service,
in cooperation with the West Virginia Agricultural and Forestry
Experiment Station

CLAY COUNTY is in the west-central part of West Virginia (fig. 1). It encompasses about 347 square miles, or 221,700 acres.

This soil survey updates an earlier survey of Braxton and Clay Counties, West Virginia (Latimer and Mooney 1920). It provides additional information about the soils in Clay County and more accurate soil maps.

Figure 1.—The location of Clay County in West Virginia.

General Nature of the County

This section provides information about some of the natural and cultural factors that affect land use in the survey area. It describes settlement and population; climate; transportation and industries; farming; relief and drainage; and geology.

Settlement and Population

The first European pioneers in Clay County were Adam O'Brien and a man named Hammond, who explored the Clay County wilderness before 1820 (Clay County History Book Committee 1989). The first European settler was Sinnett Triplett, who arrived in the area sometime between 1820 and 1830. Triplett settled on a branch of Lilly Fork, which is now called Sinnett Branch. The first permanent European settler was David McOlgin, who settled at the present location of the town of Clay. In 1858, Clay County was formed from parts of Braxton and Nicholas Counties, Virginia (Clay County History Book Committee 1994). The county was named for Senator Henry Clay.

Clay is the county seat. It was first known as the town of Marshall and later, in 1863, as the town of Henry. In 1895, the town of Henry was incorporated. It was later renamed Clay when the Post Office was designated as the Clay Post Office.

In 1990, the population of Clay County was 9,983 (U.S. Department of Commerce 1992). Clay is the only incorporated town in the survey area. It had a population of 606 in 1990. Many small, unincorporated communities are in scattered areas throughout the county.

Climate

Table 1 gives data on temperature for the survey area as recorded at the Corton Weather Station in the period 1964-90 and on precipitation as recorded at Clay in the period 1961-90. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 35.3 degrees F and the average daily minimum temperature is 24.4 degrees. The lowest temperature on record, which occurred at the Corton Weather Station on January 17, 1982, is -15 degrees. In summer, the average temperature is 72.6 degrees and the average daily maximum temperature is 84.0 degrees. The highest recorded temperature, which occurred at the Corton Weather Station on July 16, 1988, is 103 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 45.62 inches. Of this, 20.83 inches, or about 46 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 6.00 inches at Clay on September 2, 1950. Thunderstorms occur on about 44 days each year, and most occur in July.

The average seasonal snowfall is about 26.4 inches. The greatest snow depth at any one time during the period of record was 28 inches recorded on November 26, 1950. On the average, 24 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 19.0 inches recorded on January 1, 1971.

The average relative humidity in midafternoon is about 56 percent. Humidity is higher at night, and the average at dawn is about 82 percent. The sun shines 45 percent of the time possible in summer and 29 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 8.3 miles per hour, in March.

Transportation and Industries

The transportation needs of Clay County are served by Interstate 79; State Routes 4, 16, and 36; and numerous county routes. A railroad line runs along the Elk River.

The major enterprises in the county are timber and sawmill operations, coal mining, gas and oil production, and farming. The world-famous Golden Delicious apple was developed in Clay County in 1912.

Farming

In 1987, there were 97 farms in Clay County and the average size of the farms was 165 acres. In 1992, the number of farms decreased to 91 and the average size of the

farms decreased to 163 acres. There was a total of 14,868 acres of farmland in the county (U.S. Department of Commerce 1994).

The main agricultural enterprises are raising beef cattle, sheep, and hogs, in conjunction with the production of hay and pasture. Some small acreages are planted to corn or truck crops or used as orchards or vineyards. Most farms are operated on a part-time basis.

Relief and Drainage

Clay County is in two major land resource areas—the Central Allegheny Plateau and the Cumberland Plateau and Mountains (USDA 1981).

The Central Allegheny Plateau Major Land Resource Area is in the northern portion of Clay County. It is characterized by “bench-break” topography, or moderately steep ridgetops and very steep side slopes that are broken by narrow bench areas. The flood plains are narrow but widen out along Elk River and major streams.

The Cumberland Plateau and Mountains Major Land Resource Area is in the southern portion of Clay County. It is dominated by very steep, rugged side slopes that are broken by strongly sloping to steep ridgetops and nearly level bottoms along streams.

Elevation in Clay County ranges from more than 1,840 feet at the highest point, which is an unnamed knob directly south of the town of Clay on the Nicholas County line, to 641 feet at Queen Shoals, in an area where the Elk River enters Kanawha County.

The Elk River, which flows from east to west through the center of the county, is the dominant drainage system. Small drainage areas at the extreme north and south edges of the county drain into the Little Kanawha and Gauley Rivers, respectively.

Geology

Craig Savela, geologist, Natural Resources Conservation Service, helped to prepare this section.

Most of the soils in Clay County formed in material weathered from bedrock that is part of the Monongahela and Conemaugh Groups, the Allegheny Formation, and the Kanawha Formation of the Pottsville Group (Cardwell, Erwin, and Woodward 1986). These Pennsylvanian Period rocks are considered to be nearly 300 million years old (Driscoll 1989). Because of the northwest regional dip, the oldest rocks are exposed in the southern part of the county and the youngest rocks in the northernmost part of the county. The bedrock consists primarily of interbedded shale, siltstone, sandstone, and coal. Some layers of limy shale and limestone occur, mainly among the younger strata. Many coals have been extensively surface mined or deep mined in the county. The largest reserves have been mined from the No. 5 Block (Lower Kittanning) Coal of the Kanawha Formation, followed by the Upper Kittanning Coal, the Upper Freeport Coal of the Allegheny Formation, and the Pittsburgh Coal of the Monongahela Group (Hennen, Gawthrop, and White 1917).

The rock types in Clay County are in the Appalachian Plateau physiographic province. The dominant rock types of the Monongahela Group are massive and flaggy, micaceous, greenish to grayish brown sandstone; red sandy shale; thin limestones; and thin coal seams. This group is in the northern portion of Clay County and covers about 10 percent of the survey area. The Gilpin, Upshur, and Vandalia soils in this part of the county formed in material weathered from these red and yellow shales and siltstones.

The dominant rock types of the Conemaugh Group are sandstones and siltstones alternating with red sandy shales, nodular and brecciated limestones, and thin coalbeds. The dominant rock types of the Allegheny Formation are sandstones

alternating with buff to dark gray siltstones and sandy shales, fire clay shales, thin iron ore lenses, and minable coal seams. The dominant rock types of the Kanawha Formation are massive sandstones; gray and black siltstones and sandy shales; coalbeds; fire clays; and lenticular, impure limestones. These rocks are in the middle and southern portions of Clay County and cover about 90 percent of the survey area. The Gilpin, Laidig, Lily, and Pineville soils in this part of the county formed in material derived from these yellowish sandstones and siltstones.

Soils along the Elk River, Buffalo Creek, and other smaller streams formed in alluvium derived from Quaternary deposits.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research. While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior

of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Detailed Soil Map Units

Dr. John Sencindiver, professor of agronomy, West Virginia University Agricultural and Forestry Experiment Station, helped to prepare this section.

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading “Use and Management of the Soils.”

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas (figs. 2 and 3). A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

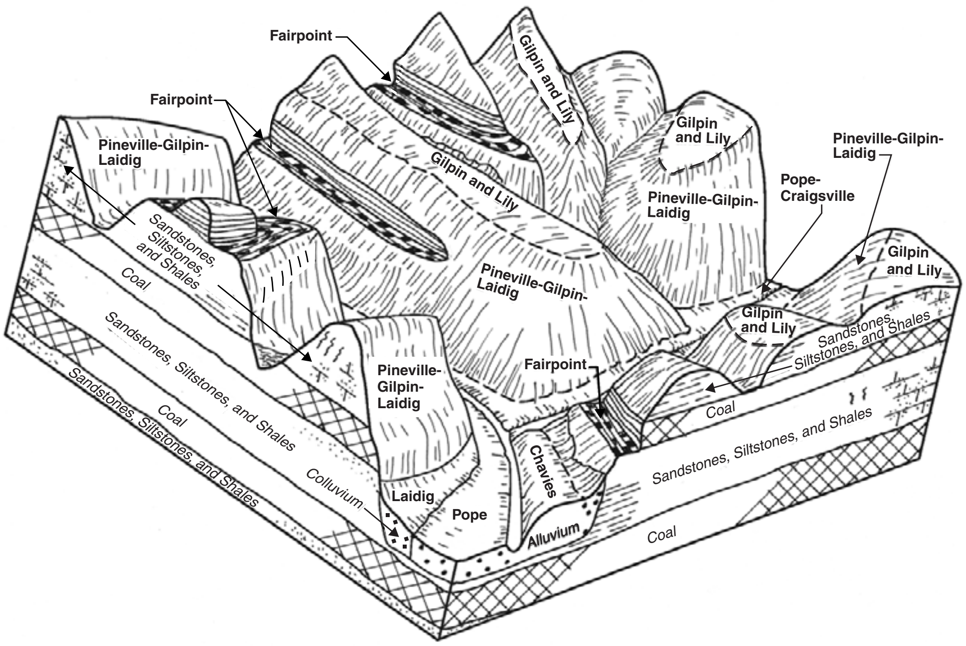

Figure 2.—The typical pattern of soils and parent material in the southern part of the county.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series***.** Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Laidig channery loam, 15 to 35 percent slopes, extremely stony, is a phase of the Laidig series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. The Pope-Craigsville complex is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Pineville-Gilpin-Laidig association, very steep, extremely stony, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up

of all of them. Gilpin and Lily soils, 8 to 15 percent slopes, is an undifferentiated group in this survey area.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

AgB—Allegheny loam, 3 to 8 percent slopes

This gently sloping soil is very deep and well drained. It is on stream terraces, mainly along the Elk River and Buffalo Creek.

Typically, the surface layer is brown loam about 9 inches thick. The subsoil extends to a depth of 50 inches. The upper 18 inches is yellowish brown clay loam. The next 9 inches is yellowish brown loam. The lower 14 inches is yellowish brown sandy clay loam. The substratum extends to a depth of more than 60 inches. It is strong brown sandy loam.

Included with this soil in mapping are a few small areas of the well drained Chavies and Laidig soils. Also included are a few small areas of soils that have slopes of less than 3 percent and soils that have slopes of more than 8 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of this Allegheny soil is moderate or high. Permeability is moderate in the subsoil. Runoff is medium, and natural fertility is low or moderate. In unlimed areas reaction is very strongly acid or strongly acid. Depth to bedrock is more than 60 inches.

Most areas of this soil are used as meadow or pasture. Some areas are used for community development, and some are forested.

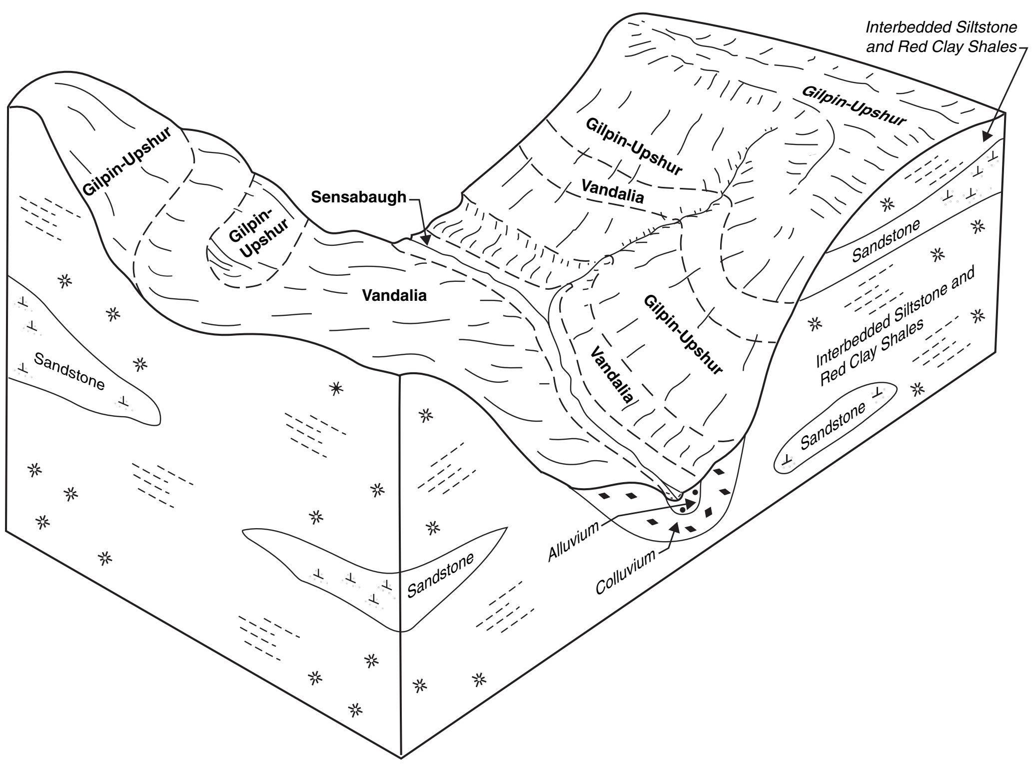

Figure 3.—The typical pattern of soils and parent material in the northern part of the county.

This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is moderate in unvegetated areas and is a management concern. Applying a system of conservation tillage, contour stripcropping, using a crop rotation that includes hay, and returning crop residue to the soil help to control erosion and to maintain soil fertility and tilth. Proper stocking rates that maintain desirable grasses and legumes and a rotation grazing system are major pasture management needs.

The potential productivity for trees is moderately high on this soil, but only a small acreage is wooded. Common tree species include red oak, yellow-poplar, sugar maple, and white ash. Plant competition is a major management concern. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand.

The hazard of erosion is the main management concern on sites for dwellings and septic tank absorption fields. Removing a minimal amount of vegetation on construction sites helps to prevent excessive erosion. Establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 2e.

CeF—Cedarcreek very channery loam, very steep, very stony

This very deep, well drained soil is on upland side slopes, footslopes, and benches that have been disturbed by surface mining operations. It generally is in contour surface-mined areas having vertical rock highwalls, nearly level to moderately steep benches, and very steep outslopes. It is mostly in southern areas of the county, near Nicholas and Kanawha Counties. Stones that are 1 to 2 feet in diameter cover 1 to 3 percent of the surface. Slope ranges from 0 to 80 percent but is dominantly 35 to 80 percent.

Typically, the surface soil is composed of leaf litter and very dark grayish brown and mixed brown very channery loam having a combined thickness of about 10 inches. The substratum extends to a depth of more than 65 inches. The upper 14 inches is brown very channery loam. The next 16 inches is dark yellowish brown very channery loam. The lower 25 inches is mixed dark yellowish brown and black extremely channery loam.

Included with this soil in mapping are a few small areas of the well drained Pineville, Gilpin, Laidig, and Fairpoint soils. Also included are a few small areas of soils that have been disturbed by surface mine operations and have rock fragments dominated by sandstone or carbolithic material; areas of soils that have as much as 50 percent of the surface covered with stones or boulders; small areas of mine refuse dumps; and some areas of wet soils in depressions. These inclusions make up about 20 percent of this map unit.

The available water capacity of this Cedarcreek soil ranges from low to high. Permeability is moderate. Runoff is very rapid, and natural fertility is moderate or low. This soil is extremely acid or very strongly acid. Depth to bedrock is more than 60 inches.

Most areas of this soil have become forested by such species as black locust, black birch, red maple, yellow-poplar, and white pine. Some areas have been seeded to sericea lespedeza, fescue, birdsfoot trefoil, and black locust. A few areas are used for pasture. Gas wells are often in areas on the nearly level and gently sloping benches.

This very stony soil is not suited to cultivated crops or hay and is difficult to manage for pasture. The stoniness and the slope restrict the use of farm machinery. The hazard of erosion is very severe in unprotected areas and is a management

concern. Proper stocking rates that maintain grasses and legumes, a rotation grazing system, application of fertilizer, and deferment of grazing in the spring until the surface of the soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on this very stony soil. The soil is suited to both conifers and deciduous trees, and most areas are wooded. The most commonly planted tree is black locust. Species that are naturally invading this map unit include yellow-poplar, birch, and sycamore. In most areas the trees are not large enough to harvest. Applying the Best Management Practices (BMPs) as recommended by the West Virginia Division of Forestry helps to overcome the severe hazard of erosion during harvest. Seedling mortality is a management concern. Planting an adequate number of healthy seedlings that are suited to the soil conditions and planting at the proper time of year help to establish a desirable stand of trees. Growth of tree seedlings may be slow because of the competition from grasses and legumes and the compaction, which is a common result of reclamation practices.

The steep slopes, surface and subsurface stones, boulders, and differential settling are the main limitations on sites for dwellings and septic tank absorption fields. Onsite investigation and testing are needed when determining soil limitations and the potential for urban uses.

The capability subclass is 7s.

Ch—Chavies fine sandy loam

This nearly level, very deep, well drained soil is on high flood plains, mainly along the Elk River and its larger tributaries. It is subject to rare flooding. Slope ranges from 0 to 3 percent.

Typically, the surface layer is brown fine sandy loam about 9 inches thick. The subsoil extends to a depth of 57 inches. The upper 9 inches is brown loam. The next 22 inches is strong brown fine sandy loam. The lower 17 inches is strong brown loam. The substratum extends to a depth of more than 60 inches. It is strong brown loam.

Included with this soil in mapping are a few small areas of the well drained Allegheny, Craigsville, Laidig, Sensabaugh, and Pope soils. Also included are a few small areas of soils that are moderately well drained and soils that have slopes of more than 3 percent. Included soils make up about 15 percent of this map unit.

The available water capacity of this Chavies soil is moderate or high. Permeability is moderately rapid in the subsoil. Runoff is slow, and natural fertility is moderate. In unlimed areas reaction ranges from very strongly acid to slightly acid. Depth to bedrock is more than 60 inches.

Most areas of this soil are used for cultivated crops or as a meadow or pasture. Some areas are reverting to woodland, and others are used as homesites.

This soil is well suited to cultivated crops, hay, and pasture. Crops can be grown continuously on this soil, but a cover crop is needed to help control erosion. Working the residue from the cover crop into the soil helps to maintain soil fertility and tilth. Proper stocking rates that maintain desirable grasses and legumes and a rotation grazing system are major pasture management needs.

The potential productivity for trees is moderately high on this soil. Common tree species include red oak, sycamore, white oak, and yellow-poplar. Plant competition is a major management concern. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand.

The flooding is the main management concern on sites for dwellings and septic tank absorption fields. The Sutton Dam helps to protect some of the areas along the Elk River from 100-year storms. Protecting the soil from flooding or choosing a better suited soil helps to prevent the damage caused by flooding. Establishing a plant cover

in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 1.

FpF—Fairpoint channery loam, very steep, very stony

This very deep, well drained soil is on uplands, side slopes, and benches that have been disturbed by surface mining operations. Stones that are 1 to 2 feet in diameter cover 1 to 3 percent of the surface. Slope dominantly ranges from 35 to 70 percent.

Typically, the surface layer is dark grayish brown channery loam about 4 inches thick. The substratum extends to a depth of more than 60 inches. The upper 13 inches is mixed strong brown and dark gray channery loam. The lower part is brown very channery clay loam with dark gray, black, and strong brown lithochromic mottles.

Included with this soil in mapping are a few small areas of the well drained Cedarcreek, Gilpin, Pineville, and Upshur soils. Also included are a few small areas of soils that have been disturbed by surface mine operations and have a high degree of acidity; areas of soils that have as much as 50 percent of the surface covered with stones or boulders; small areas of mine refuse dumps; small areas of wet soils in depressions; areas of surface-mined soils that have vertical highwalls ranging from 10 to 100 feet in height; and areas of mine soils that have slopes of less than 15 percent. Inclusions make up about 20 percent of this map unit.

The available water capacity of this Fairpoint soil is very low or moderate. Permeability is moderately slow. Runoff is very rapid, and natural fertility is moderate or high. Reaction is moderately acid to neutral. Depth to bedrock is more than 60 inches.

Most areas of this soil have been seeded to sericea lespedeza, fescue, birdsfoot trefoil, and black locust. Some smaller areas are used as woodland, and a few areas are used as pasture. Gas wells are sometimes in areas on the nearly level and gently sloping benches.

This very stony soil is not suited to cultivated crops or hay and is difficult to manage for pasture. The stoniness and the slope restrict the use of farm machinery. The hazard of erosion is very severe in unprotected areas and is a management concern. Proper stocking rates that maintain grasses and legumes, a rotation grazing system, application of fertilizer, and deferment of grazing in the spring until the surface of the soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on this very stony soil. The soil is suited to both coniferous and deciduous tree species. The most commonly planted tree is black locust. Species that are naturally invading this map unit include yellow-poplar, red and sugar maples, birch, and sycamore. Applying the Best Management Practices (BMPs) as recommended by the West Virginia Division of Forestry helps to overcome the severe hazard of erosion during harvest. Seedling mortality is a management concern. Planting an adequate number of healthy seedlings that are suited to the soil conditions and planting at the proper time of year help to establish a desirable stand of trees. Growth of tree seedlings may be slow because of the competition from grasses and legumes and the compaction that is a common result of reclamation practices.

The steep slopes, the surface and subsurface stones, and boulders are the main limitations on sites for dwellings and septic tank absorption fields. Other potential problems are the hazards of slippage and subsidence. Onsite investigation and testing are needed when determining soil limitations and the potential for urban uses.

The capability subclass is 7s.

GaF—Gilpin silt loam, 35 to 70 percent slopes, very stony

This very steep, moderately deep, well drained soil is on hillsides. It is in the northern part of the county.

Typically, the surface layer of this Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the subsoil is strong brown channery silty clay loam. The substratum extends to a depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Included with this soil in mapping are small areas of the well drained Kaymine, Pineville, Upshur, and Vandalia soils and Udorthents. Also included are a few small areas of soils that have slopes of less than 35 percent and areas of soils that have slopes of more than 70 percent. Included soils make up about 25 percent of this map unit.

The available water capacity is moderate in this Gilpin soil. Permeability also is moderate. Runoff is very rapid, and natural fertility is moderate. In unlimed areas reaction ranges from strongly acid to extremely acid. Depth to bedrock ranges from 20 to 40 inches.

Nearly all areas are used as woodland. This soil is not suited to cultivated crops, hay, or pasture. The slope restricts the use of farm machinery. The hazard of erosion is very severe in unprotected areas and is a major management concern.

The potential productivity for trees is moderately high on this soil. Common tree species include red oak, white oak, hickory, American beech, sugar maple, and yellow-poplar. The hazard of erosion on logging roads and skid trails and the equipment limitation are major management concerns because of the very steep slopes. Applying the Best Management Practices (BMPs) as recommended by the West Virginia Division of Forestry helps to overcome the severe hazard of erosion during harvest. Seedling mortality on south aspects is a management concern. Intensive management to keep undesirable plants from competing with native plants or planted seedlings may be necessary for the establishment of a desirable stand. Laying out roads and skid trails nearly on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining a protective cover of sod on roadbanks help to control erosion.

The slope and the restricted depth to bedrock are the main limitations on sites for dwellings and septic tank absorption fields. This soil is generally not used as a site for dwellings or septic tank absorption fields. If the vegetation on this soil is disturbed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 7s.

GuC—Gilpin-Upshur complex, 8 to 15 percent slopes

These strongly sloping, moderately deep to very deep, well drained soils are on ridgetops in the northern part of the county. They occur as areas so intermingled that it was not practical to map them separately. This map unit is about 50 percent Gilpin silt loam and 30 percent Upshur silt loam.

Typically, the surface layer of this Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the subsoil is strong brown channery silty clay loam. The substratum extends to a

depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Typically, the surface layer of this Upshur soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 7 inches. The subsoil extends to a depth of 42 inches. The upper 4 inches is reddish brown silt loam. The next 11 inches is red silty clay. The lower 20 inches is dusky red clay. The substratum extends to a depth of 65 inches. It is dusky red channery silty clay loam. Red shale is at a depth of 65 inches.

Included with the Gilpin and Upshur soils in mapping are small areas of the well drained Lily soils. Also included are a few small areas of soils that have as much as 3 percent of their surface covered with stones, areas of soils that have slopes of less than 8 percent, areas of soils that have slopes of more than 15 percent, and areas of soils that have had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 20 percent of this map unit.

The available water capacity is moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is rapid on both soils. Natural fertility is moderate in the Gilpin soil and moderate or high in the Upshur soil. In unlimed areas reaction ranges from strongly acid to extremely acid in the Gilpin soil and from slightly alkaline to very strongly acid in the Upshur soil. Depth to bedrock ranges from 20 to 40 inches in the Gilpin soil and from 40 to 65 inches in the Upshur soil. The shrink-swell potential is high in the subsoil of the Upshur soil. The Upshur soil is highly susceptible to soil slippage.

About half of the acreage of this map unit is used as woodland. The other half is used as meadow or pasture (fig. 4).

These soils are suited to cultivated crops, hay, and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. If these soils are cultivated, applying a system of conservation tillage, contour stripcropping, using a crop rotation that includes hay, maintaining a protective cover of sod in shallow drainageways, and returning crop residue to the soil help to control erosion and to maintain soil fertility and tilth. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on the Gilpin soil and moderate on the Upshur soil. Common tree species include red oak, white oak, hickory, American beech, and yellow-poplar. The control of erosion on logging roads and skid trails and plant competition are management concerns. Seedling mortality is a concern on south aspects of the Gilpin soil because south-facing sites typically are drier than other sites and less water is available for seedlings. The use of equipment may be restricted in areas of the Upshur soil during wet periods. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining a protective cover of sod on roadbanks help to control erosion.

The slope and the depth to bedrock are the main limitations on sites for dwellings and septic tank absorption fields in areas of the Gilpin soil. The bedrock underlying the soil generally is rippable, but it may hinder excavation. In places it is hard sandstone. Building on the bedrock and adding fill material when landscaping help to overcome the depth to bedrock. Selecting areas of deeper and less sloping soils, installing the absorption field on the contour, and installing a larger absorption field than is typical help to overcome the limitations on sites for septic tank absorption fields.

The slope, the slow permeability, the high shrink-swell potential in the subsoil, and soil slippage are the main limitations on sites for dwellings and septic tank absorption

Figure 4.—Christmas tree production and pasture in an area of Gilpin-Upshur complex, 8 to 15 percent slopes, near Elkhurst. The surrounding pasture is in an area of Gilpin-Upshur complex, 25 to 35 percent slopes.

fields in areas of the Upshur soil. Selecting areas of less sloping soils, designing dwellings so that they conform to the landscape, backfilling with porous material, and constructing wide, reinforced footings that are adequately drained help to overcome the limitations on sites for dwellings. Selecting areas of less clayey soils and installing a larger absorption field than is typical help to overcome the slow permeability. If the vegetation on these soils is disturbed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 3e in areas of the Gilpin soil and 4e in areas of the Upshur soil.

GuD—Gilpin-Upshur complex, 15 to 25 percent slopes

These moderately steep, moderately deep to very deep, well drained soils are on ridgetops and benches in the northern part of the county. The benches are commonly dissected by drainageways. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Gilpin silt loam and 30 percent Upshur silt loam.

Typically, the surface layer of this Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches.

The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the subsoil is strong brown channery silty clay loam. The substratum extends to a depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Typically, the surface layer of this Upshur soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 7 inches. The subsoil extends to a depth of 42 inches. The upper 4 inches is reddish brown silt loam. The next 11 inches is red silty clay. The lower 20 inches is dusky red clay. The substratum extends to a depth of 65 inches. It is dusky red channery silty clay loam. Red shale is at a depth of 65 inches.

Included with these soils in mapping are small areas of the well drained Fairpoint and Vandalia soils and Udorthents. Also included are a few small areas of soils that have as much as 3 percent of their surface covered with stones, areas of soils that have slopes ranging from 8 to 15 percent, areas of soils that have slopes ranging from 25 to 35 percent, and areas of soils that have had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 25 percent of this map unit.

The available water capacity is moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is rapid on both soils. Natural fertility is moderate in the Gilpin soil and moderate or high in the Upshur soil. In unlimed areas reaction ranges from strongly acid to extremely acid in the Gilpin soil and from slightly alkaline to very strongly acid in the Upshur soil. Depth to bedrock ranges from 20 to 40 inches in the Gilpin soil and from 40 to 62 inches in the Upshur soil. The shrink-swell potential is high in the subsoil of the Upshur soil. The Upshur soil is highly susceptible to soil slippage.

About half of the acreage of this map unit is used as woodland. The other half is used as meadow or pasture (fig. 5).

Figure 5.—A hayfield in an area of Gilpin-Upshur complex, 15 to 25 percent slopes.

The soils in this map unit have limited suitability for cultivated crops. They are better suited to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. If these soils are cultivated, applying a system of conservation tillage, contour stripcropping, using a crop rotation that includes hay, maintaining a protective cover of sod in shallow drainageways, and returning crop residue to the soil help to control erosion and to maintain soil fertility and tilth. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and deferment of grazing in the spring until the soils are reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on the Gilpin soil. In areas of the Upshur soil, it is moderately high on north aspects and moderate on south aspects. Common tree species include red oak, white oak, hickory, American beech, and yellow-poplar. The control of erosion on logging roads and skid trails and plant competition are major management concerns. Seedling mortality is a concern on south aspects of the Gilpin soil because south-facing sites typically are drier than other sites and less water is available for seedlings. The use of equipment is restricted in areas of the Upshur soil during wet periods. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining a protective cover of sod on roadbanks help to control erosion.

The slope and the depth to bedrock are the main limitations on sites for dwellings and septic tank absorption fields in areas of the Gilpin soil. The bedrock underlying the soil generally is rippable, but it may hinder excavation. In places it is hard sandstone. Building on the bedrock and adding fill material when landscaping help to overcome the depth to bedrock. Selecting areas of deeper and less sloping soils, installing the absorption field on the contour, and installing a larger absorption field than is typical help to overcome the limitations on sites for septic tank absorption fields.

The slope, the slow permeability, the high shrink-swell potential in the subsoil, and soil slippage are the main limitations on sites for dwellings and septic tank absorption fields in areas of the Upshur soil. Selecting areas of less sloping soils, designing dwellings so that conform to the landscape, backfilling with porous material, and constructing wide, reinforced footings that are adequately drained help to overcome the limitations on sites for dwellings. Selecting areas of less clayey soils and installing a larger absorption field than is typical help to overcome the slow permeability. If the vegetation on these soils is disturbed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 4e in areas of the Gilpin soil and 6e in areas of the Upshur soil.

GuE—Gilpin-Upshur complex, 25 to 35 percent slopes

These steep, moderately deep to very deep, well drained soils are on hillsides, benches, and narrow ridgetops in the northern part of the county. The hillsides and benches are commonly dissected by drainageways. The soils occur as areas so intermingled that it was not practical to map them separately. The map unit is about 35 percent Gilpin silt loam and 35 percent Upshur silt loam.

Typically, the surface layer of the Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the

subsoil is strong brown channery silty clay loam. The substratum extends to a depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Typically, the surface layer of the Upshur soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 7 inches. The subsoil extends to a depth of 42 inches. The upper 4 inches is reddish brown silt loam. The next 11 inches is red silty clay. The lower 20 inches of the subsoil is dusky red clay. The substratum extends to a depth of 65 inches. It is dusky red channery silty clay loam. Red shale is at a depth of 65 inches.

Included with these soils in mapping are small areas of the well drained Laidig and Vandalia soils and Udorthents. Also included are a few small areas of soils that have as much as 3 percent of their surface covered with stones, areas of soils that have slopes ranging from 15 to 25 percent, areas of soils that have slopes ranging from 35 to 70 percent, and areas of soils that have had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 30 percent of this map unit.

The available water capacity is moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is very rapid on both soils. Natural fertility is moderate in the Gilpin soil and moderate or high in the Upshur soil. In unlimed areas reaction ranges from strongly acid to extremely acid in the Gilpin soil and from slightly alkaline to very strongly acid in the Upshur soil. Depth to bedrock ranges from 20 to 40 inches in the Gilpin soil and from 40 to 65 inches in the Upshur soil. The shrink-swell potential is high in the subsoil of the Upshur soil. The Upshur soil is highly susceptible to soil slippage.

Most areas of these soils are used as woodland. Some are used as pasture.

These soils are not suited to cultivated crops or hay, but they are suited to pasture. The very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are major management concerns. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high in areas of the Gilpin soil. In areas of the Upshur soil, it is moderately high on north aspects and moderate on south aspects. Common tree species include red oak, white oak, hickory, American beech, and yellow-poplar. The control of erosion on logging roads and skid trails, the equipment limitation, and plant competition are major management concerns. Applying the Best Management Practices (BMPs) as recommended by the West Virginia Division of Forestry helps to overcome the severe hazard of erosion during harvest. Seedling mortality is a concern on south aspects of the Gilpin soil because south-facing sites typically are drier than other sites and less water is available for seedlings. The use of equipment is restricted during wet periods in areas of the Upshur soil. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining a protective cover of sod on roadbanks help to control erosion.

The slope and the depth to bedrock are the main limitations on sites for dwellings and septic tank absorption fields in areas of the Gilpin soil. The slope, the slow permeability, the high shrink-swell potential in the subsoil, and the hazard of soil slippage are the main management concerns in areas of the Upshur soil. These soils are not suited to most urban areas. A suitable alternative site should be selected. If the vegetation on these soils is disturbed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 6e in areas of the Gilpin soil and 7e in areas of the Upshur soil.

GxF—Gilpin-Upshur complex, 35 to 70 percent slopes, very stony

These very steep, moderately deep to very deep, well drained soils are on hillsides in the northern part of the county. The hillsides are commonly dissected by drainageways. These soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 50 percent Gilpin silt loam and 30 percent Upshur silt loam.

Typically, the surface layer of the Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the subsoil is strong brown channery silty clay loam. The substratum extends to a depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Typically, the surface layer of the Upshur soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 7 inches. The subsoil extends to a depth of 42 inches. The upper 4 inches is reddish brown silt loam. The next 11 inches is red silty clay. The lower 20 inches is dusky red clay. The substratum extends to a depth of 65 inches. It is dusky red channery silty clay loam. Red shale is at a depth of 65 inches.

Included with these soils in mapping are small areas of the well drained Fairpoint, Pineville, and Vandalia soils. Also included are a few small areas of soils that have as much as 3 percent of their surface covered with stones, areas of soils that have slopes ranging from 25 to 35 percent, and areas of soils that have had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 20 percent of this map unit.

The available water capacity is moderate in the Gilpin soil and moderate or high in the Upshur soil. Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is very rapid on both soils. Natural fertility is moderate in the Gilpin soil and moderate or high in the Upshur soil. In unlimed areas reaction ranges from strongly acid to extremely acid in the Gilpin soil and from slightly alkaline to very strongly acid in the Upshur soil. Depth to bedrock ranges from 20 to 40 inches in the Gilpin soil and from 40 to 65 inches in the Upshur soil. The shrink-swell potential is high in the subsoil of the Upshur soil. The Upshur soil is highly susceptible to soil slippage.

Nearly all areas of these soils are used as woodland. A few are used as pasture.

These soils are not suited to cultivated crops, hay, or pasture. The slope restricts the use of farm machinery. A very severe hazard of erosion in unprotected areas is a major management concern.

The potential productivity for trees is moderately high in areas of the Gilpin soil. In areas of the Upshur soil, it is moderately high on north aspects and moderate on south aspects. Common tree species include red oak, white oak, hickory, American beech, red and sugar maples, and yellow-poplar. The control of erosion on logging roads and skid trails, the equipment limitation, and plant competition are major management concerns. Applying the Best Management Practices (BMPs) as recommended by the West Virginia Division of Forestry helps to overcome the severe hazard of erosion during harvest. Seedling mortality is a concern on south aspects of the Gilpin soil because south-facing sites typically are drier than other sites and less water is available for seedlings. The use of equipment is restricted in areas of the

Upshur soil during wet periods because the soil is highly susceptible to slippage. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining a protective cover of sod on roadbanks help to control erosion.

The slope and the depth to bedrock are the main limitations on sites for dwellings and septic tank absorption fields in areas of the Gilpin soil. The slope, the slow permeability, the high shrink-swell potential in the subsoil, and soil slippage are the main limitations in areas of the Upshur soil. These soils are generally not used as a site for dwellings or septic tank absorption fields. If the vegetation on these soils is disturbed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 7s.

GyC—Gilpin and Lily soils, 8 to 15 percent slopes

These strongly sloping, moderately deep, well drained soils are on ridgetops, mainly in the southern and eastern parts of the county. Most areas of this map unit are predominantly Gilpin soil, some are predominantly Lily soil, and many contain both soils. The map unit is about 55 percent Gilpin soil and 25 percent Lily soil. These soils were mapped together because they are similar in use and management and have similar interpretive properties.

Typically, the surface layer of the Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the subsoil is strong brown channery silty clay loam. The substratum extends to a depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Typically, the surface layer of the Lily soil is composed of hardwood leaf litter and very dark gray to brown loam having a combined thickness of about 4 inches. The subsoil extends to a depth of 32 inches. The upper 8 inches is yellowish brown loam, the next 8 inches is strong brown and yellowish brown loam, the next 8 inches is strong brown clay loam, and the lower 4 inches of the subsoil is strong brown channery sandy loam. Sandstone bedrock is at a depth of 32 inches.

Included with these soils in mapping are small areas of the well drained Cedarcreek, Fairpoint, Laidig, Pineville, and Upshur soils and Udorthents. Also included are a few small areas of soils that have as much as 3 percent of their surface covered with stones, areas of soils that have slopes of less than 8 percent, areas of soils that have slopes of more than 15 percent, and areas of soils that have had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 20 percent of this map unit.

The available water capacity of the Gilpin and Lily soils is moderate. Permeability is moderate in the Gilpin soil and moderately rapid in the Lily soil. Runoff is rapid on both soils. Natural fertility is moderate in the Gilpin soil and moderately low in the Lily soil. In unlimed areas of both soils, reaction ranges from strongly acid to extremely acid. Depth to bedrock ranges from 20 to 40 inches.

About half of the acreage of this map unit is used as woodland. The other half is used as meadow or pasture

These soils are suited to cultivated crops, hay, and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. If these soils are cultivated, applying a system of conservation tillage, contour stripcropping, using a crop rotation that includes hay, maintaining a protective cover of sod in shallow

drainageways, and returning crop residue to the soil help to control erosion and to maintain soil fertility and tilth. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on these soils. Common tree species include red oak, scarlet oak, black oak, chestnut oak, red maple, white oak, hickory, American beech, and yellow-poplar. Plant competition is a major management concern. Seedling mortality is a concern on south aspects of the Gilpin soil because south-facing sites typically are drier than other sites and less water is available for seedlings. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining vegetation on roadbanks help to control erosion and maintain trafficability.

The slope and the depth to bedrock are the main limitations on sites for dwellings and septic tank absorption fields. The bedrock underlying the Gilpin soil generally is rippable, but it may hinder excavation. The bedrock underlying the Lily soil typically is hard sandstone. Building on the bedrock and adding fill material when landscaping help to overcome the depth to bedrock. Selecting areas of deeper and less sloping soils, installing the absorption fields on the contour, and installing a larger absorption field than is typical help to overcome the limitations on sites for septic tank absorption fields in areas of the Gilpin soil. If the vegetation on these soils is disturbed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 3e.

GyD—Gilpin and Lily soils, 15 to 25 percent slopes

These moderately steep, moderately deep, well drained soils are on ridgetops, mostly in the southern portion of the county. Most areas are predominantly Gilpin soil, some are predominantly Lily soil, and many contain both soils. This map unit is about 55 percent Gilpin soil and 25 percent Lily soil. These soils were mapped together because they are similar in use and management and have similar interpretive properties.

Typically, the surface layer of the Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the subsoil is strong brown channery silty clay loam. The substratum extends to a depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Typically, the surface layer of the Lily soil is composed of hardwood leaf litter and very dark gray to brown loam having a combined thickness of about 4 inches. The subsoil extends to a depth of 32 inches. The upper 8 inches is yellowish brown loam, the next 8 inches is strong brown and yellowish brown loam, the next 8 inches is strong brown clay loam, and the lower 4 inches of the subsoil is strong brown channery sandy loam. Sandstone bedrock is at a depth of 32 inches.

Included with these soils in mapping are small areas of the well drained Cedarcreek, Fairpoint, Laidig, Pineville, and Upshur soils and Udorthents. Also included are a few small areas of soils that have as much as 3 percent of their surface covered with stones, areas of soils that have slopes of less than 15 percent, areas of soils that have slopes of more than 25 percent, and areas of soils that have

had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 20 percent of this map unit.

The available water capacity of these Gilpin and Lily soils is moderate. Permeability is moderate in the Gilpin soil and moderately rapid in the Lily soil. Runoff is rapid on both soils. Natural fertility is moderate in the Gilpin soil and moderately low in the Lily soil. In unlimed areas of both soils, reaction ranges from strongly acid to extremely acid. Depth to bedrock ranges from 20 to 40 inches.

Most areas of these soils are used as woodland. Some have been cleared for development, and others are used as meadow or pasture.

These soils have limited suitability for cultivated crops. They are better suited to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. If these soils are cultivated, applying a system of conservation tillage, contour stripcropping, using a crop rotation that includes hay, maintaining a protective cover of sod in shallow drainageways, and returning crop residue to the soil help to control erosion and to maintain soil fertility and tilth. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and deferment of grazing in the spring until the soils are reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on these soils. Common tree species include red oak, scarlet oak, black oak, chestnut oak, red maple, white oak, hickory, American beech, and yellow-poplar. Plant competition and the hazard of erosion are major management concerns. Seedling mortality is a concern on south aspects because south-facing sites typically are drier than other sites and less water is available for seedlings. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining vegetation on roadbanks help to control erosion.

The slope and the depth to bedrock are the main limitations on sites for dwellings and septic tank absorption fields in areas of these soils. The bedrock underlying the Gilpin soil generally is rippable, but it may hinder excavation. The bedrock underlying the Lily soil is typically hard sandstone, and it can be very difficult to excavate. Building on the bedrock and adding fill material when landscaping help to overcome the depth to bedrock. Selecting areas of deeper and less sloping soils, installing the absorption fields on the contour, and installing a larger absorption field than is typical may help to overcome the limitations on sites for septic tank absorption fields. If the vegetation on these soils is disturbed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 4e.

GyE—Gilpin and Lily soils, 25 to 35 percent slopes

These steep, moderately deep, well drained soils are on ridgetops and low hills, mostly in the southern part of the county. Most areas of this map unit are predominantly Gilpin soil, some are predominantly Lily soil, and many contain both soils. This map unit is about 55 percent Gilpin soil and 25 percent Lily soil. These soils are mapped together because they are similar in use and management and have similar interpretive properties.

Typically, the surface layer of the Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown

silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the subsoil is strong brown channery silty clay loam. The substratum extends to a depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Typically, the surface layer of the Lily soil is composed of hardwood leaf litter and very dark gray to brown loam having a combined thickness of about 4 inches. The subsoil extends to a depth of 32 inches. The upper 8 inches is yellowish brown loam, the next 8 inches is strong brown and yellowish brown loam, the next 8 inches is strong brown clay loam, and the lower 4 inches is strong brown channery sandy loam. Sandstone bedrock is at a depth of 32 inches.

Included with these soils in mapping are small areas of the well drained Cedarcreek, Fairpoint, Laidig, Pineville, and Upshur soils and Udorthents. Also included are a few small areas of soils that have as much as 3 percent of their surface covered with stones, areas of soils that have slopes of less than 25 percent, areas of soils that have slopes of more than 35 percent, and areas of soils that have had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 20 percent of this map unit.

The available water capacity of the Gilpin and Lily soils is moderate. Permeability is moderate in the Gilpin soil and moderately rapid in the Lily soil. Runoff is very rapid on both soils. Natural fertility is moderate in the Gilpin soil and moderately low in the Lily soil. In unlimed areas of both soils, reaction ranges from strongly acid to extremely acid. Depth to bedrock ranges from 20 to 40 inches.

Most areas of these soils are used as woodland. Some have been cleared for development or are used as meadow or pasture.

These soils are not suited to cultivated crops or hay; however, they are suited to pasture. The very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are major management concerns. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on these soils. Common tree species include red oak, scarlet oak, black oak, chestnut oak, white oak, red maple, hickory, American beech, and yellow-poplar. The control of erosion on logging roads and skid trails, the equipment limitation, and plant competition are major management concerns. Seedling mortality is a concern on south aspects because south-facing sites typically are drier than other sites and less water is available for seedlings. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining vegetation on roadbanks help to control erosion.

The slope and the depth to bedrock are severe limitations on sites for dwellings and septic tank absorption fields in areas of these soils. A suitable alternative site should be considered. The bedrock underlying the Gilpin soil generally is rippable, but it may hinder excavation. The bedrock underlying the Lily soil is typically hard sandstone, and it is very difficult to excavate. Building on the bedrock and adding fill material when landscaping help to overcome the depth to bedrock. Selecting areas of deeper and less sloping soils, installing the absorption fields on the contour, and installing a larger absorption field than is typical help to overcome the limitations on sites for septic tank absorption fields. If the vegetation on these soils is disturbed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 6e.

ItF—Itmann channery clay loam, very steep

This somewhat excessively drained soil formed mostly in material derived from coal and high-carbon shale. It is generally in valley fills and on the steep and very steep side slopes that are close to both active and previously active mining operations in the southeastern part of Clay County. In most areas the mine spoil has been covered with 12 to 20 inches of natural soil material removed from the surrounding area during reclamation activities (fig. 6). Slope ranges from 0 to 80 percent but dominantly ranges from 35 to 70 percent.

Typically, the surface layer is yellowish brown channery clay loam about 12 inches thick. The substratum extends to a depth of more than 65 inches. The upper 14 inches is black extremely channery sandy loam. The lower 39 inches is black very channery sandy loam with pockets of loamy sand. Carbolith fragments constitute more than 50 percent of the total content of rock fragments.

Included with this soil in mapping are a few small areas of the well drained Cedarcreek, Fairpoint, Gilpin, and Laidig soils. Also included are a few small areas where the mine spoil has not been covered with natural soil material, areas where the mine spoil is covered with more than 20 inches of natural soil material, and areas where as much as 15 percent of the surface is covered with stones and boulders. Included soils make up about 20 percent of this map unit.

Figure 6.—A reclaimed area of Itmann channery clay loam, very steep, near Widen, West Virginia.

The available water capacity of this Itmann soil is low or moderate. Permeability is moderately rapid in the substratum. Runoff is very rapid. Natural fertility is low. In unlimed areas reaction ranges from extremely acid to strongly acid. Depth to bedrock is more than 60 inches.

Most areas have been seeded to sericea lespedeza, fescue, birdsfoot trefoil, or black locust.

This soil is not suited to cultivated crops or hay and is difficult to manage for pasture. The slope restricts the use of farm machinery. If this soil is pastured, the very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are major management concerns. Proper stocking rates that maintain desirable grasses and legumes and a rotation grazing system are major pasture management needs.

The potential productivity for trees is low on this soil. Sycamore, birch, red maple, and yellow-poplar are naturally invading some areas of the soil. Seedling mortality is a management concern. Planting healthy seedlings with well developed root systems and timing planting to take full advantage of spring rains reduce the seedling mortality rate. On south and west aspects, mulching may be required to aid in seedling survival. Growth of native trees and planted seedlings is slow because the fertility level and water-holding capacity are low.

The steep slopes and differential settling are the main limitations on sites for dwellings and septic tank absorption fields. Onsite investigation and testing are needed when determining soil limitations and the potential for urban uses. If the vegetative cover is removed, establishing a plant cover in unprotected areas and providing for proper surface water disposal help to control erosion and sedimentation.

The capability subclass is 7s.

LaE—Laidig channery loam, 15 to 35 percent slopes, extremely stony

This moderately steep and steep, very deep, well drained soil is on footslopes, along drainageways, and on benches in the lower half of the county. Stones that are 10 to 24 inches in diameter cover 3 to 15 percent of the surface of this soil.

Typically, the surface layer of this Laidig soil is composed of hardwood leaf litter and dark brown channery loam having a combined thickness of about 7 inches. The subsoil extends to a depth of more than 65 inches. The upper 4 inches is dark yellowish brown channery loam. The next 31 inches is yellowish brown channery loam. The lower 23 inches of the subsoil is a fragipan of very firm and brittle, yellowish brown channery loam with light gray and strong brown redoximorphic features.

Included with this soil in mapping are a few small areas of the well drained Gilpin, Lily, and Pineville soils and Udorthents. Also included are some small areas of Craigsville and Pope soils that are so small in size that they could not be delineated at the scale selected for mapping; a few small areas of soils that have a seasonal high water table within a depth of 3 feet; areas where less than 3 percent or more than 15 percent of the surface is covered with stones; areas of soils that have slopes of less than 15 percent; and areas of soils that have slopes of more than 35 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Laidig soil is moderate. Permeability is slow or moderately slow in the fragipan in the subsoil. Runoff is rapid or very rapid. Natural fertility is low. A seasonal high water table is at a depth of about 3 to 4 feet. In unlimed areas reaction is extremely acid or very strongly acid. Depth to bedrock is more than 60 inches.

Most areas of this soil are used as woodland. A few have been cleared and are used for pasture or community development.

This extremely stony soil is not suited to cultivated crops or hay and is difficult to manage for pasture. The slope and the stones restrict the use of farm machinery. The very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are major management concerns. Proper stocking rates that maintain desirable grasses and legumes and a rotation grazing system are major pasture management needs.

The potential productivity for trees is moderately high on this soil. The slope limits the operation of equipment. The slope, the stones, and low soil strength may limit the construction of haul roads and major skid trails. The slope severely limits the location of log landings. Locating log landings in areas of the included, less sloping soils helps to overcome the slope. Haul roads, major skid trails, and log landings may be subject to severe rutting during wet periods unless they are strengthened by adding gravel to the surface. The hazard of erosion is moderate. Constructing haul roads and major skid trails near the contour, installing water bars and culverts, establishing and maintaining a crown on the road, and establishing and maintaining vegetation on roadbanks help to control erosion and runoff.

The slope is the main limitation on sites for dwellings. The slope, the slow permeability, and the wetness are the main limitations on sites for septic tank absorption fields. A suitable alternative site should be considered. If the vegetative cover is removed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 7s.

PGF—Pineville-Gilpin-Laidig association, very steep, extremely stony

These moderately deep and very deep, well drained soils are on mountain side slopes, mostly in the southern half of the county. Slopes are long, and the landscape is deeply dissected by numerous drainageways. This map unit is about 35 percent Pineville and similar soils, 25 percent Gilpin and similar soils, and 20 percent Laidig and similar soils. Typically, Pineville soils are on side slopes and in coves; Gilpin soils are on convex, upper and middle side slopes; and Laidig soils are on the lower side slopes, on very steep footslopes, and in coves. Stones that are 10 to 24 inches in diameter cover 3 to 15 percent of the surface of this map unit. Slopes dominantly range from 35 to 70 percent.

Typically, the surface layer of this Pineville soil is composed of hardwood leaf litter and very dark grayish brown channery loam having a combined thickness of about 4 inches. The subsoil extends to a depth of 54 inches. It is dark yellowish brown and yellowish brown channery loam and yellowish brown very channery loam. The substratum extends to a depth of more than 60 inches. It is yellowish brown very channery loam.

Typically, the surface layer of this Gilpin soil is composed of hardwood leaf litter and very dark grayish brown silt loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 29 inches. The upper 4 inches is dark yellowish brown silt loam. The next 13 inches is yellowish brown silt loam. The lower 6 inches of the subsoil is strong brown channery silty clay loam. The substratum extends to a depth of 37 inches. It is strong brown channery silty clay loam. Fractured sandstone bedrock is at a depth of 37 inches.

Typically, the surface layer of this Laidig soil is composed of hardwood leaf litter and dark brown channery loam having a combined thickness of about 7 inches. The subsoil extends to a depth of more than 65 inches. The upper 4 inches is dark yellowish brown channery loam. The next 31 inches is yellowish brown channery

loam. The lower 23 inches of the subsoil is a fragipan of very firm and brittle yellowish brown channery loam with light gray and strong brown redoximorphic features.

Included with these soils in mapping are small areas of the well drained Lily and Upshur soils; small areas of the well drained Cedarcreek and Itmann soils that have been disturbed by mining; areas of Fairpoint soils where surface mining occurred after soil mapping; and a few small areas of the well drained Pope, Craigsville, and Chavies soils on flood plains. Also included are some areas of soils that have more rock fragments throughout the profile than the named components of this map unit; areas of soils that are only 40 to 60 inches deep over bedrock; areas of rock outcrops on ridges and side slopes; areas of soils that have slopes of less than 35 percent and are on ridgetops; areas of soils that have slopes of more than 55 percent; areas of soils that have a thick, dark surface layer; and areas where stones and boulders cover more than 15 percent of the surface. Included soils make up about 20 percent of this map unit.

The available water capacity is moderate or high in the Pineville soil and moderate in the Gilpin and Laidig soils. Permeability is moderate in the Pineville and Gilpin soils and moderately slow or slow in the fragipan of the Laidig soils. Runoff is very rapid on all three soils. Natural fertility is moderate in the Pineville and Gilpin soils and moderately low in the Laidig soil. In unlimed areas reaction is very strongly acid or strongly acid in the Pineville soil and ranges from extremely acid to strongly acid in the Gilpin and Laidig soils. Depth to bedrock is more than 60 inches in areas of the Laidig and Pineville soils and ranges from 20 to 40 inches in areas of the Gilpin soil.

Most areas of these soils are used as woodland. A few have been cleared and are used as pasture.

These extremely stony soils are not suited to cultivated crops or hay and are difficult to manage for pasture. The slope and stones restrict the use of farm machinery. The very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are major management concerns. Proper stocking rates that maintain desirable grasses and legumes and a rotation grazing system are major pasture management needs.

The potential productivity is moderately high for trees on these soils. Common trees include red oak, white oak, hickory, American beech, sugar maple, and yellow-poplar. Chestnut oak, black oak, and scarlet oak are common on south-facing aspects. The control of erosion on logging roads and skid trails, the equipment limitation, and plant competition are major management concerns. Applying the Best Management Practices (BMPs) as recommended by the West Virginia Division of Forestry helps to overcome the severe hazard of erosion during harvest. On south aspects, seedling mortality is a concern in areas of the Gilpin and Pineville soils since they are drier sites and have less water available to seedlings. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining a protective cover of sod on roadbanks help to control erosion. On slopes of more than 55 percent, conventional skidder logging techniques are not recommended. The use of specialized equipment or management techniques, such as cable yarding, should be considered before harvesting timber in these areas. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Site preparation following harvest and the establishment of a new forest without delay help to reduce plant competition. Planting healthy seedlings with well developed root systems and timing planting to take full advantage of spring rains reduce the seedling mortality rate.

The slope is the main limitation on sites for dwellings and septic tank absorption fields in areas of these soils. Depth to bedrock is an additional limitation in areas of the Gilpin soil. The bedrock underlying the Gilpin soil generally is rippable, but it may hinder excavation. The slow permeability and the wetness are additional limitations in

areas of the Laidig soil. These three soils are generally not suited to most urban uses. A suitable alternative site should be considered. If the vegetative cover is removed, establishing a plant cover in unprotected areas and providing for proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 7s.

Po—Pope sandy loam

This nearly level, very deep, well drained soil is on flood plains, mainly along the Elk River, Lilly Fork, and Buffalo, Leatherwood, Middle, Sycamore, Porter, and Laurel Creeks in Clay County. Slope ranges from 0 to 3 percent.

Typically, the surface layer is composed of hardwood leaf litter and brown sandy loam having a combined thickness of about 6 inches. The subsoil extends to a depth of 36 inches. The upper 9 inches is dark yellowish brown sandy loam. The lower 21 inches is yellowish brown sandy loam. The substratum extends to a depth of more than 60 inches. It is yellowish brown sandy loam.

Included with this soil in mapping are a few small areas of the well drained Allegheny, Chavies, Craigsville, Laidig, and Sensabaugh soils. Also included are a few small areas of soils that have a seasonal high water table within a depth of 3 feet. Included soils make up about 15 percent of this map unit.

The available water capacity of this Pope soil is moderate or high. Permeability is moderate or moderately rapid. Runoff is slow. Natural fertility is moderate. In unlimed areas reaction ranges from strongly acid to extremely acid. Depth to bedrock is more than 60 inches.

Most areas of this soil are used as meadow, pasture, or woodland or for cultivated crops (fig. 7).

This soil is suited to cultivated crops, hay, and pasture. Crops can be grown continuously on the soil, but a cover crop is needed to help control erosion. Working the residue from the cover crop into the soil helps to maintain soil fertility and tilth. In places crops are subject to damage from flooding. Proper stocking rates that maintain desirable grasses and legumes and a rotation grazing system are major pasture management needs.

The potential productivity for trees is moderately high on this soil. Common tree species include red oak, sycamore, and yellow-poplar. Plant competition is a management concern. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Minimizing soil disturbance during harvest operations reduces the potential for flood scouring and helps to control erosion.

The flooding is a severe limitation on sites for dwellings and septic tank absorption fields. This soil should not be used as a site for dwellings or septic tank absorption fields unless it is protected by a properly designed flood-control structure. A better suited soil should be selected. If the vegetation is removed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 2w.

Px—Pope-Craigsville complex

These nearly level, very deep, well drained soils are on flood plains and on alluvial fans at the mouth of hollows. Slope ranges from 0 to 3 percent. The soils occur as areas so intermingled that it was not practical to map them separately. The map unit is about 50 percent Pope sandy loam and 30 percent Craigsville gravelly sandy loam.

Figure 7.—A meadow along Blue Run in an area of Pope sandy loam.

Typically, the surface layer of this Pope soil is composed of hardwood leaf litter and brown sandy loam having a combined thickness of about 6 inches thick. The subsoil is sandy loam to a depth of 36 inches. The upper 9 inches is dark yellowish brown, and the lower 21 inches is yellowish brown. The substratum extends to a depth of more than 60 inches. It is yellowish brown sandy loam.

Typically, the surface layer of this Craigsville soil is composed of hardwood leaf litter and dark brown gravelly sandy loam having a combined thickness of about 8 inches. The subsoil extends to a depth of 37 inches. The upper 21 inches is dark yellowish brown extremely gravelly sandy loam. The lower 8 inches of the subsoil is dark yellowish brown very gravelly sandy loam. The substratum extends to a depth of more than 60 inches. It is dark yellowish brown extremely gravelly sandy loam.

Included with these soils in mapping are a few small areas of the well drained Chavies and Laidig soils. Also included are a few small areas that include sand and gravel bars directly adjacent to the stream channels and a few small areas of soils that have a seasonal high water table within a depth of 3 feet. Inclusions make up about 20 percent of this map unit.

The available water capacity is moderate or high in this Pope soil and low or moderate in this Craigsville soil. Permeability is moderate or moderately rapid in the

Pope soil and moderately rapid in the Craigsville soil. Runoff is slow on both soils. Natural fertility is moderate. In unlimed areas reaction ranges from extremely acid to strongly acid in the Pope soil and is very strongly acid or strongly acid in the Craigsville soil. Depth to bedrock is more than 60 inches in both soils.

Most areas of these soils are used as woodland or for hay and pasture.

These soils are suited to cultivated crops, hay, and pasture. Droughtiness is a major management concern during dry periods in areas of the Craigsville soil. In places crops are subject to damage from flooding. Growing cover crops, incorporating crop residue into the soil, applying a system of conservation tillage, and using a crop rotation that includes hay help to improve the water-holding capacity and maintain soil fertility and tilth. Proper stocking rates that maintain desirable grasses and legumes and a rotation grazing system are major pasture management needs.

The potential productivity for trees is moderately high on these soils. Common tree species include red oak, sycamore, basswood, and yellow-poplar. Plant competition is a management concern in areas of the Pope and Craigsville soils. Seedling mortality is an additional concern in areas of the Craigsville soil. Intensive management to keep undesirable plants from competing with native plants or planted seedlings may be necessary for the establishment of a desirable stand. Minimizing soil disturbance during harvest operations reduces the potential for flood scouring and helps to control erosion.

The flooding is a major limitation on sites for dwellings and septic tank absorption fields. The moderately rapid permeability in the Craigsville soil is an additional limitation on sites for septic tank absorption fields. This map unit should not be used as a site for dwellings or septic tank absorption fields unless the site is protected by a properly designed flood-control structure. A suitable alternative site should be selected. If the vegetative cover on these soils is removed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 2w.

Ss—Sensabaugh silt loam

This nearly level, very deep, well drained soil is on flood plains along secondary streams and their tributaries in the northern part of the county. It is subject to occasional flooding. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is brown gravelly loam about 24 inches thick. The substratum extends to a depth of more than 60 inches. It is brown very gravelly loam.

Included with this soil in mapping are a few small areas of the well drained Pope, Craigsville, Vandalia, and Laidig soils. Also included are a few small areas of poorly drained soils, soils that are subject to rare flooding, and soils that have slopes of more than 3 percent.

The available water capacity of this Sensabaugh soil is moderate or high. Permeability is moderate or moderately rapid. Runoff is slow. Natural fertility is high. In unlimed areas reaction ranges from moderately acid to slightly alkaline. Depth to bedrock is more than 60 inches.

Most areas of this soil are used as meadow or pasture or for cultivated crops. A few are used as woodland or are reverting to woodland.

This soil is suited to cultivated crops, hay, and pasture. Crops can be grown continuously on this soil, but a cover crop is needed to help control erosion. Incorporating the residue from the cover crop into the soil helps to maintain soil fertility and tilth. In places crops are subject to damage from flooding. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and

deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

The potential productivity is moderately high for trees on this soil. Common tree species include red oak, sycamore, basswood, and yellow-poplar. Plant competition is a management concern. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. The soil is subject to rutting when heavy equipment is operated on it during wet periods. Minimizing soil disturbance during harvest operations reduces the potential for flood scouring and helps to control erosion.

The flooding is the main management concern on sites for dwellings and septic tank absorption fields. This soil should not be used as a site for dwellings and septic tank absorption fields unless the site is protected by a properly designed flood-control structure. A suitable alternative site should be selected. If the vegetative cover is removed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 2w.

Ud—Udorthents, smoothed

These nearly level to very steep, very shallow to very deep, well drained soils are mostly in areas that have been disturbed by road construction or by earth moving associated with mining activities, or both. The soils are throughout the county. Slope ranges from 0 to 70 percent.

Typically, this map unit consists of dark yellowish brown to yellowish brown channery or very channery soil material. In most areas these soils are well drained, but some areas include wet soils. Most of the soil material is loamy, but in some areas the soil material is clayey. Reaction ranges from very strongly acid to neutral. Fertility is generally low.

Included with these soils in mapping are a few small areas of the well drained Craigsville, Fairpoint, Gilpin, Laidig, Pineville, Pope, Sensabaugh, Upshur, and Vandalia soils. Also included are a few small areas that have been covered with concrete or asphalt. Inclusions make up about 20 percent of this map unit.

It is impractical to estimate the physical and chemical properties of these soils because of the disturbed nature of the soil material and the high degree of variability. Most fill areas are more than 60 inches deep to bedrock. Runoff ranges from slow in nearly level areas to very rapid in very steep areas.

These soils generally are not used for cultivated crops, hay, pasture, or woodland. Some areas have been seeded to sericea lespedeza, orchardgrass, and fescue to help control erosion and sedimentation. Trees that are naturally invading this map unit include yellow-poplar, sycamore, and birch.

Because of its extreme variability, an onsite investigation is necessary to determine the suitability of this map unit for any proposed use. If the vegetative cover is removed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

These soils are not assigned a capability subclass.

VaD—Vandalia silt loam, 15 to 25 percent slopes

This moderately steep, very deep, well drained soil is on footslopes and in areas around the head of drainageways. It is in the northern part of the county.

Typically, the surface layer of this Vandalia soil is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of 44 inches. The upper 6 inches is

brown silty clay loam. The next 14 inches is reddish brown silty clay. The lower 16 inches is reddish brown channery silty clay. The substratum extends to a depth of more than 60 inches. It is reddish brown channery silty clay.

Included with this soil in mapping are a few small areas of the well drained Gilpin, Lily, Pineville, Sensabaugh, and Upshur soils. Also included are a few small areas of soils that have a seasonal high water table within a depth of 2.5 feet, soils that have as much as 15 percent of their surface covered with stones, soils that have slopes of less than 15 percent, soils that have slopes of more than 25 percent, and soils that have had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 25 percent of this map unit.

The available water capacity of this Vandalia soil is moderate or high. Permeability is slow or moderately slow. Runoff is rapid. Natural fertility is moderate or high. In unlimed areas reaction ranges from very strongly acid to slightly acid. Depth to bedrock is more than 60 inches.

About half of the acreage of this soil is used as woodland. The other half is used as meadow or pasture.

This soil has limited suitability for cultivated crops. It is better suited to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. If the soil is cultivated, applying a system of conservation tillage, contour stripcropping, using a crop rotation that includes hay, maintaining a protective cover of sod in shallow drainageways, and returning crop residue to the soil help to control erosion and to maintain soil fertility and tilth. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on this soil. Common tree species include red oak, white oak, hickory, American beech, and yellow-poplar. Plant competition, the equipment limitation, and the control of erosion on logging roads and skid trails are management concerns. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. The use of equipment should be restricted during wet periods because the soil has low soil strength and is susceptible to soil slippage. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining a protective cover of sod on roadbanks help to control erosion.

The slope, a high shrink-swell potential in the subsoil, the slow permeability in the subsoil, and the hazard of soil slippage are major management concerns on sites for dwellings and septic tank absorption fields. Because of the moderately steep slopes, additional grading is needed on sites for roads, dwellings, and other structures and lawns are difficult to maintain. Selecting areas of less sloping soils, designing dwellings so that conform to the landscape, backfilling with porous material, and constructing wide, reinforced footings that are adequately drained help to overcome the slope, the high shrink-swell potential, and the hazard of soil slippage on sites for dwellings. Selecting areas of less sloping soils, installing the absorption fields on the contour, installing a larger absorption field than is typical, and selecting areas of less clayey soils help to overcome the slope and the slow permeability on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 4e.

VaE—Vandalia silt loam, 25 to 35 percent slopes

This steep, very deep, well drained soil is on footslopes and benches at the base of the steeper slopes and in areas around the head of drainageways. It is in the northern part of the county.

Typically, the surface layer of this Vandalia soil is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of 44 inches. The upper 6 inches is brown silty clay loam. The next 14 inches is reddish brown silty clay. The lower 16 inches is reddish brown channery silty clay. The substratum extends to a depth of more than 60 inches. It is reddish brown channery silty clay.

Included with this soil in mapping are a few small areas of the well drained Gilpin, Pineville, Sensabaugh, and Upshur soils. Also included are a few small areas of soils that have as much as 3 percent of their surface covered with stones, soils that have slopes ranging from 15 to 25 percent, soils that have slopes of more than 35 percent, and soils that have had more than 75 percent of the original topsoil removed by erosion. Included soils make up about 25 percent of this map unit.

The available water capacity is moderate or high. Permeability is slow or moderately slow. Runoff is very rapid. Natural fertility is moderate or high. In unlimed areas reaction ranges from very strongly acid to slightly acid. Depth to bedrock is more than 60 inches.

Most areas of this soil are used as woodland (fig. 8). Some are used as meadow or pasture.

This soil is not suited to cultivated crops or hay, but it is suited to pasture. The very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are major management concerns. Proper stocking rates that maintain desirable grasses and legumes, a rotation grazing system, and deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on this soil. Common tree species include red oak, white oak, hickory, American beech, and yellow-poplar. The hazard of erosion, the equipment limitation, and plant competition are major management concerns. Applying the Best Management Practices (BMPs) as recommended by the West Virginia Division of Forestry helps to overcome the severe hazard of erosion during harvest. The use of equipment should be restricted during wet periods because of low soil strength and the hazard of soil slippage. Intensive management to keep undesirable plants from competing with native plants or planted seedlings is necessary for the establishment of a desirable stand. Laying out roads and skid trails on the contour, diverting surface water away from the roads, establishing and maintaining a crown on the road, and establishing and maintaining a protective cover of sod on roadbanks help to control erosion.

The slope, the high shrink-swell potential in the subsoil, the slow permeability in the subsoil, and soil slippage are the main management concerns on sites for dwellings and septic tank absorption fields. This soil is not suited to most urban uses. A suitable alternative site for dwellings and septic tank absorption fields should be considered. If the vegetation on this soil is removed, establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

The capability subclass is 6e.

Figure 8.—A stand of oaks in an area of Vandalia silt loam, 25 to 35 percent slopes.

W—Water

This map unit consists of areas inundated with water for most of the year. It generally includes rivers, lakes, and ponds.

No interpretations are given for this map unit.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Most of the soils in the survey area have a moderate or low supply of basic plant nutrients, making the application of lime and fertilizer necessary. The amounts to be applied should be based on the type of soil, crop history, severity of erosion, the type of crop grown, the level of desired yield, and analyses of the soil and plants.

The organic matter content is low in most soils in the county, and increasing it is not normally feasible. In soils suited to crops, it is important to maintain the current level of organic matter content by adding farm manure; using crop residue in and on the soil; and growing sod crops, cover crops, and green-manure crops. The organic

matter content can be maintained in soils used for pasture with proper pasture management, which helps to prevent overgrazing and soil erosion.

Tillage tends to break down soil structure and increases the oxidation of organic matter by soil organisms. It should be kept to the minimum necessary to prepare the seedbed and help control weeds. Avoiding tillage during periods when soil moisture is excessive or insufficient helps to reduce the loss of soil structure and minimize soil compaction. Maintaining the organic matter content of the plow layer also helps to protect the soil structure.

In cultivated areas, runoff and erosion generally occur before a good cover of crops is established or soon after the crops have been harvested. All of the gently sloping and steeper soils that are cultivated are subject to erosion and thus require a suitable cropping system for erosion control. The main management needs of such a system are the proper rotation of crops, minimum tillage, mulch planting, the return of crop residue to the soil, cover crops and green-manure crops, and applications of lime and fertilizer. Other major erosion-control practices are contour cultivation, contour stripcropping, diversions that control runoff, and grassed waterways. The effectiveness of a particular combination of these measures can differ from one soil to another.

Proper pasture management is the key to controlling erosion in pastured areas. A high level of pasture management, including liming, fertilizing, controlled grazing, and carefully selecting the mixture of the pasture vegetation, is needed on most soils to provide enough ground cover to help prevent erosion and maintain long-term productivity. Grazing is controlled by rotating the livestock from one pasture to another and providing recovery periods to allow regrowth of forages. Different soil types may require different pasture mixtures based on soil fertility, severity of erosion, and available moisture. Available soil moisture may be improved in many soil types by subsoiling, which improves infiltration and slows surface runoff. Much of the erosion in pastures can be prevented by properly locating watering facilities, managing the winter feeding areas, and restricting livestock access to creeks.

In addition to the traditional crops oriented toward livestock systems, the potential exists for the development of other economically important agriculture in Clay County. Some small-scale orchards and vineyards are present in the county (fig. 9). Where such operations are undertaken, local climate and slope considerations are important factors of viable production. Planting the appropriate varieties of crops, selecting areas where there are no frost pockets, and maintaining soil fertility are major productivity factors. The planning and maintenance of the layout of orchards and vineyards, including the control of runoff, will help to ensure accessibility for crop management and harvesting.

Cultivated crops other than those shown in table 5 are grown in home gardens throughout the survey area. Estimated yields for garden crops are not given in the table, but the suitability for cultivated crops is given in the section "Detailed Soil Map Units" for each soil type. The local office of the Natural Resources Conservation Service or the West Virginia University Extension Service can provide additional information about the management and productivity of soils for these crops.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

Figure 9.—A vineyard in an area of Gilpin-Upshur complex, 15 to 25 percent slopes.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields may increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used

in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals 1 through 9. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of the map units in this survey area is given in the section “Detailed Soil Map Units” and in the yields table.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming

methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 6,650 acres in Clay County, or nearly 3 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are along streams and rivers in the county (fig. 10). Although these soils possess the characteristics of prime farmland, they do not account for a dominant portion of agricultural output from the county because they typically are in individual areas that are too small to farm.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to commercial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 7. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading “Detailed Soil Map Units.”

Figure 10.—An area of Chavies fine sandy loam along the Elk River near Procious. Areas of this soil are considered to be prime farmland.

Woodland Management and Productivity

Barbara McWhorter, state staff forester, Natural Resources Conservation Service, helped to prepare this section.

Forestland in Clay County makes up about 198,500 acres, or nearly 90 percent of the total acreage in the county (DiGiovanni 1990). The tracts range in size from small farm woodlots to large areas of corporate-owned woodlands.

The common forest types, or natural associations of tree species, and the percentage of the woodland in which they occur are the oak-hickory type, which makes up about 84 percent, and the northern hardwoods type, which makes up about 16 percent (DiGiovanni 1990). The usage of these forest types belies the fact that a great diversity of forest species exist across the county, depending on soil type, aspect, landform, and the presence of a seed source. Oaks, hickories, beech, red maples, black gum, cucumbertree, and basswood generally occur in areas throughout the county. Yellow-poplar, basswood, white ash, and sugar maple may be found in coves. Chestnut oak, scarlet oak, black oak, Virginia pine, and red maple are predominant along ridges because they can tolerate the wind and drought. Northern red oak, shagbark hickory, and a variety of other species are common on side slopes and the broader ridgetops. Their presence varies primarily with aspect. Pioneer species, such as sassafras, sourwood, dogwood, sumac, blackgum, red maple, black locust, redbud, and pines, are commonly in disturbed areas that have been revegetated. White pines and other trees may be planted in areas of strip mines, and many pioneer species occur in the strip-mined areas. Other species that are relatively rare or in scattered areas of the county are black cherry, black walnut, American elm, and butternut.

Woodland is a very important component of the economic resources of Clay County. Currently, there are two full-time sawmill operations in the county, in addition to several smaller part-time mills (West Virginia Department of Agriculture 1991). A large proportion of harvested timber is exported out of the county in log form, to become part of value-added economies in other counties, states, or countries. Harvested logs are utilized for many purposes, ranging from fine veneer to pulp for paper. The recent establishment of oriented-strand board plants in adjacent counties has increased the utilization of smaller, poorly formed trees, increasing the silvicultural and marketing possibilities for forest managers. Additionally, forests provide habitat for a larger ecological framework that includes many other important benefits of various economic significance. The gathering of medicinal and culinary items from forest ecosystems has a long history in the region, and it promises future benefits if management is appropriate.

Many factors determine the productivity of forests in the county. Among them are available moisture, soil physical and chemical characteristics, cutting (silvicultural) history, insect and disease factors, fire events, and aspect. This soil survey contains information directly pertinent to all of these factors, except for insects and disease. Table 8 contains specific interpretations for woodland management. Additionally, table 16 contains many of the soil characteristics pertaining to available moisture and physical characteristics.

The aspect of soils with slopes of 15 percent or more affects the potential productivity of forests. North aspects are defined as having compass direction that ranges from 315 to 135 degrees. South aspects have compass direction ranging from 135 to 315 degrees. The potential productivity of forests is generally higher on north aspects than on south aspects, in part, because of the differences in soil moisture, humidity, and solar radiation patterns (Hicks 1998). Aspect also affects the occurrence of tree species and the degree of management concerns. In particular, soils on south aspects are more prone to forest fires, which usually burn hotter and

more completely on south slopes than on north slopes. Thus, trees on soils with south aspect often suffer more damage from fires than trees on north-facing sites.

Table 8 can be used by forest owners and managers in planning the use of soils for wood crops. Only the soils suitable for the production of commercial trees are listed. The table lists the soil limitations to be considered in management. *Slight, moderate,* and *severe* indicate the degree of the major soil limitations.

Erosion hazard is the probability that significant soil loss will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based primarily on the percent of slope and secondarily on the erodibility of the soil. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, the texture of the surface layer, soil wetness, rock outcrops, and stones on the surface. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the forest canopy. The main factors that affect plant competition are the available water capacity and overall potential productivity of the soil. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can generally become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in

intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Recreation

John Cox, district conservationist, Natural Resources Conservation Service, helped to prepare this section.

Clay County offers a number of recreational opportunities for the public to enjoy. The Wallback Public Hunting and Fishing Area, which is adjacent to Interstate 79, is easily accessible to the public. Many other hunting and fishing opportunities are available throughout the county on private and company-owned land. Laurel Creek is stocked with trout during the spring months by the Department of Natural Resources. The Elk River offers very good warmwater fishing with many public access areas along the roads that follow the river. One such access point is off Route 4 in Mary L. Chiltin Park, which also has picnic facilities. The major attraction in Clay County is the Golden Delicious Festival, which is held the first weekend in October. The County Fair is held in September at Bradley Field in Clay, and the Clay Swimming Pool is open to the public during the summer months.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public wastewater treatment. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do

not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the period of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Casey Schrader, state biologist, Natural Resources Conservation Service, helped to prepare this section.

Wildlife habitat in Clay County is best suited to the needs of woodland wildlife species since 90 percent of the survey area is forested. Woodland species include whitetail deer, wild turkey, and gray and fox squirrels. Ruffed grouse populations are generally low throughout the county; however, areas that are in the early stages of succession or regrowth areas from timber harvests typically provide habitat for larger populations of grouse. The population of black bear is significant and increasing.

The population of openland wildlife species, such as bobwhite quail, dove, and meadowlark, is low because the acreage of cultivated farmland is limited. Cottontail rabbits inhabit brushy areas and border areas between woodland and open fields.

Native furbearers and most indigenous nongame species are common throughout the survey area. The populations of fox, muskrat, skunks, and opossums are large, as are those of groundhogs, crows, small mammals, and songbirds. The beaver population is growing, and river otters have been reintroduced to the Elk River valley. Fur prices have a direct effect on the local population of furbearers.

Large waterfowl species, such as Canada geese, and smaller waterfowl, such as teal, wood duck, and mallards, are found in small flocks along Elk River and its larger tributaries. Water birds, such as the great blue heron, sandpipers, and kingfishers, can be found along streams and waterways throughout the county.

Local rivers, streams, and ponds support various species of warmwater fish. Common game species include smallmouth bass, largemouth bass, channel catfish, crappie, muskie, and assorted sunfish. Trout have been stocked in several streams in the county. Most streams also support numerous nongame species. Fish and other aquatic populations in some areas have been seriously affected by sedimentation and acid drainage from coal mining.

Local landowners can manipulate habitat on their property in a manner designed to increase the carrying capacity for specific types of wildlife. While openland species are not expected to become prominent unless major land use changes are made, local populations of such species can be increased through careful planning.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate

vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarticks, quackgrass, and ragweed.

Hardwood trees and woody understory produce nuts and other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, yew, cedar, and hemlock.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, arrowhead, burrweed, pickerelweed, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include meadow vole, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, frogs, and tree swallows.

Engineering

John Eddy, state conservation engineer, helped to prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the “Soil Properties” section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways,

pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table,

depth to bedrock or to a cemented pan, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and

cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil

performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir

areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a

soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for plants and soil organisms.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliquivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliquivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Soil Features

Table 17 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 18 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils

are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit)* and base (*lower limit)* of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff 1975, 1992). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, mixed, active, mesic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in

the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff 1975) and in “Keys to Soil Taxonomy” (Soil Survey Staff 1992). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section “Detailed Soil Map Units.”

Allegheny Series

The Allegheny series consists of very deep, well drained soils that formed in alluvial deposits washed from acid soils on uplands. Allegheny soils are on terraces, mainly along the Elk River and Buffalo Creek. Slope ranges from 3 to 8 percent.

Allegheny soils are on the landscape with the well drained Chavies, Craigsville, Laidig, and Pope soils. Allegheny soils contain more clay in the B horizon than Chavies or Pope soils, contain fewer rock fragments than Craigsville soils, and do not have a fragipan like that of Laidig soils.

Typical pedon of Allegheny loam, 3 to 8 percent slopes, in a meadow; in the community of Cressmont; about 2,500 feet south of the confluence of The Gulf Creek with Buffalo Creek and about 2,000 feet northwest of the confluence of Dog Run with Buffalo Creek; USGS Swandale topographic quadrangle; lat. 38 degrees 27 minutes 32 seconds N. and long. 80 degrees 59 minutes 19 seconds W.

Ap—0 to 9 inches; brown (10YR 4/3) loam; moderate medium granular structure; friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 27 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; many fine and medium roots; strongly acid; clear wavy boundary.

Bt2—27 to 36 inches; yellowish brown (10YR 5/6) loam; moderate medium and coarse subangular blocky structure; friable; common distinct clay films on faces of peds; many fine roots; strongly acid; clear wavy boundary.

Bt3—36 to 50 inches; yellowish brown (10YR 5/6) sandy clay loam with few medium black (10YR 2/1) coatings of magnesium; moderate coarse subangular blocky structure; friable; few faint clay films on faces of peds; few fine roots; strongly acid; clear wavy boundary.

C—50 to 65 inches; strong brown (7.5YR 5/6) sandy loam; massive; friable; strongly acid.

The thickness of the solum ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. The content of gravel and cobbles ranges from 0 to 15 percent, by volume, in the solum and from 0 to 35 percent, by volume, in the C horizon. In unlimed areas reaction is strongly acid or very strongly acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 2 to 4. The texture of the fine-earth material is loam. The Ap horizon has weak or moderate, fine or medium granular structure and very friable or friable consistence.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 6 to 8. The texture of the fine-earth material is loam, clay loam, or sandy clay loam. The Bt horizon has moderate medium or coarse subangular blocky structure and friable consistence.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 to 8. The texture of the fine-earth material is loam, clay loam, sandy clay loam, or sandy loam. The C horizon has friable consistence.

Cedarcreek Series

The Cedarcreek series consists of very deep, well drained soils that formed in regolith from the surface mining of coal. The regolith is a mixture of partially weathered bedrock fragments and partially weathered fine-earth material and is in areas that have been disturbed by surface mine operations. Cedarcreek soils are on side slopes, ridgetops, and footslopes that have been surface mined for coal. Stones cover 1 to 3 percent of the surface. Slope ranges from 15 to 70 percent.

Cedarcreek soils are on the landscape with the well drained Fairpoint, Gilpin, Itmann, Laidig, Lily, and Pineville soils. Cedarcreek soils have more rock fragments in the control section than Gilpin, Laidig, Lily, and Pineville soils; are more acid than Fairpoint soils; and do not have a predominance of carbolithic rock fragments like Itmann soils.

Typical pedon of Cedarcreek very channery loam, very steep, very stony; about 1 mile up Williams Hollow from West Virginia Highway 16 at Bentree; USGS Bentree topographic quadrangle; lat. 38 degrees 17 minutes 11 seconds N. and long. 81 degrees 12 minutes 25 seconds W.

Oi—0 to 1 inch; slightly decomposed leaf litter.

A—1 to 8 inches; very dark grayish brown (10YR 3/2) very channery loam, brown (10YR 5/3) dry; weak medium granular structure; very friable; many very fine to coarse roots; 40 percent channers (30 percent shale and mudstone, 60 percent sandstone, 10 percent carbolithic material); strongly acid; clear wavy boundary.

AC—8 to 10 inches; mixed brown (10YR 4/3 and 5/3) very channery loam; weak fine and medium subangular blocky structure; friable; common fine coarse roots; 50 percent channers (30 percent shale and mudstone, 60 percent sandstone, 10 percent carbolithic material); very strongly acid; gradual wavy boundary.

C1—10 to 24 inches; brown (10YR 5/3) very channery loam with strong brown (7.5YR 5/8) and gray (7.5YR 5/1) lithochromic mottles; massive; friable; common fine to coarse roots; 50 percent channers (25 percent shale and mudstone, 60 percent sandstone, 15 percent carbolithic material); very strongly acid.

C2—24 to 40 inches; dark yellowish brown (10YR 4/4) very channery loam with strong brown (7.5YR 5/8) and gray (7.5YR 5/1) lithochromic mottles; massive; friable; few fine and medium roots; 50 percent channers (25 percent shale and mudstone, 50 percent sandstone, 25 percent carbolithic material); very strongly acid.

C3—40 to 65 inches; mixed dark yellowish brown (10YR 4/4) and black (10YR 2/1) extremely channery loam; massive; friable; few fine and medium roots; 70 percent channers (25 percent shale and mudstone, 40 percent sandstone, 35 percent carbolithic material); extremely acid.

The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 60 percent, by volume, in the A and AC horizons and from 35 to 80 percent, by volume, in the C horizon. The rock fragments are mainly mudstone, sandstone, and shale with smaller amounts of carbolithic material. The percentage of each is less than 65 percent of the total content of rock fragments in the control section. In unlimed areas reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 1 to 6. The texture of the fine-earth material is loam or silt loam. The A horizon has weak or moderate, fine or medium granular structure and friable or very friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 1 to 6. The texture of the fine-earth material is loam, sandy loam, or silt loam. The C horizon is massive and has firm, friable, or very friable consistence.

Chavies Series

The Chavies series consists of very deep, well drained soils that formed in alluvial deposits washed from acid soils on uplands. Chavies soils are on high flood plains, mostly along Buffalo and Otter Creeks, Lilly Fork, and Elk River. In some areas along Elk River, these soils are protected from 100-year floods by Sutton Dam. Elsewhere in the county, they are subject to rare flooding. Slope ranges from 0 to 3 percent.

Chavies soils are on the landscape with the well drained Allegheny, Craigsville, Pope, and Sensabaugh soils. Chavies soils have more clay in the B horizon than Craigsville and Pope soils, have less clay in the B horizon than Allegheny soils, and do not have the gravelly layers typical of Sensabaugh soils.

Typical pedon of Chavies fine sandy loam, in a meadow; along Otter Creek; about 2,000 feet northeast of the confluence of Otter Creek with Elk River and 1,200 feet southeast of the confluence of Laurel Run with Otter Creek; USGS Ivydale topographic quadrangle; lat. 38 degrees 32 minutes 18 seconds N. and long. 82 degrees 01 minute 44 seconds W.

Ap—0 to 9 inches; brown (10YR 4/3) fine sandy loam; moderate fine and medium granular structure; friable; many fine and medium roots; neutral; abrupt smooth boundary.

Bt1—9 to 18 inches; brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; many fine and medium roots; moderately acid; clear wavy boundary.

Bt2—18 to 40 inches; strong brown (7.5YR 4/6) fine sandy loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; many fine and medium roots; very strongly acid; clear wavy boundary.

Bt3—40 to 57 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds; few fine and medium roots; very strongly acid; clear wavy boundary.

C—57 to 65 inches; strong brown (7.5YR 5/6) loam; massive; friable; very strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 10 percent, by volume, in individual horizons of the solum and from 0 to 20 percent, by volume, in the C horizon. In unlimed areas reaction is very strongly acid to slightly acid.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. The texture of the fine-earth material is fine sandy loam. The Ap horizon has weak or moderate, fine or medium granular structure and very friable or friable consistence.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The texture of the fine-earth material is fine sandy loam or loam. The Bt horizon has moderate fine or medium subangular blocky structure and friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The texture of the fine-earth material is fine sandy loam, sandy loam, or loam. The C horizon has friable or very friable consistence.

Craigsville Series

The Craigsville series consists of very deep, well drained soils that formed in alluvial material washed from acid soils on uplands. Craigsville soils are on flood plains and on alluvial fans at the mouth of hollows, mostly on Lilly Fork and Buffalo, Leatherwood, Middle, Sycamore, Porter, and Laurel Creeks in Clay County. Slope ranges from 0 to 3 percent.

Craigsville soils are on the landscape with the well drained Allegheny, Chavies, Pope, and Sensabaugh soils. Craigsville soils have more rock fragments in the B and C horizons than the other soils.

Typical pedon of Craigsville gravelly sandy loam, in a wooded area of Pope-Craigsville complex; at the confluence of Frank Branch with Lilly Fork; USGS Clay topographic quadrangle; lat. 38 degrees 23 minutes 51 seconds N. and long. 81 degrees 01 minute 13 seconds W.

Oi—0 to 2 inches; slightly decomposed hardwood leaf litter.

A—2 to 8 inches; dark brown (10YR 3/3) gravelly sandy loam, brown (10YR 5/3) dry; weak fine granular structure; very friable; many fine, medium, and coarse roots; 15 percent rock fragments; very strongly acid; abrupt smooth boundary.

Bw1—8 to 29 inches; dark yellowish brown (10YR 4/4) extremely gravelly sandy loam; weak fine subangular blocky structure; very friable; few fine, medium, and coarse roots; 65 percent rock fragments; very strongly acid; clear wavy boundary.

Bw2—29 to 37 inches; dark yellowish brown (10YR 4/4) very gravelly sandy loam; weak medium and coarse subangular blocky structure; very friable; common fine, medium, and coarse roots; 50 percent rock fragments; very strongly acid; clear wavy boundary.

C—37 to 65 inches; dark yellowish brown (10YR 4/4) extremely gravelly loamy sand; massive; very friable; 70 percent rock fragments; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. The content of rounded gravel and cobbles ranges from 15 to 35 percent in the A horizon and from 35 to 70 percent in individual horizons of the B and C horizons. In unlimed areas reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3. The texture of the fine-earth material is sandy loam. The A horizon has weak fine or medium granular structure and very friable consistence.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 4 or 6. The texture of the fine-earth material is sandy loam or loam. The Bw horizon has weak fine, medium, and coarse subangular blocky structure and has friable or very friable consistence.

The C horizon has hue of 10YR, value of 4, and chroma of 4 or 6. The texture of the fine-earth material is sandy loam or loamy sand. The C horizon has very friable or loose consistence.

Fairpoint Series

The Fairpoint series consists of very deep, well drained soils that formed in regolith from the surface mining of coal. The regolith is a mixture of partially weathered bedrock fragments and partially weathered fine-earth material and is in areas that have been disturbed by surface mine operations. Fairpoint soils are on ridgetops, side slopes, and footslopes. Stones cover 1 to 3 percent of the surface. Slope ranges from 15 to 70 percent.

Fairpoint soils are on the landscape with the well drained Cedarcreek, Gilpin, Itmann, Laidig, Lily, and Pineville soils. Fairpoint soils are less acid than Cedarcreek soils and have more rock fragments in the control section than Gilpin, Laidig, Lily, and Pineville soils.

Typical pedon of Fairpoint channery loam, very steep, very stony; about 3,200 feet southwest of the confluence of Sinnett Branch with Lilly Fork; USGS Clay topographic quadrangle; lat. 38 degrees 26 minutes 11 seconds N. and long. 81 degrees 03 minutes 17 seconds W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) channery loam; common medium distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) lithochromic mottles; moderate fine and medium granular structure; friable; many fine and medium roots; 30 percent channers (60 percent shale and mudstone, 35 percent sandstone, 5 percent high-carbon material); slightly acid; abrupt wavy boundary.

C1—4 to 17 inches; mixed strong brown (7.5YR 5/6) and dark gray (10YR 4/1) channery loam; massive; friable; many very fine and fine roots; 45 percent channers (60 percent shale and mudstone, 35 percent sandstone, 5 percent high-carbon material); neutral; clear irregular boundary.

C2—17 to 65 inches; brown (10YR 4/3) very channery clay loam; many medium distinct dark gray (10YR 4/1), black (10YR 2/1), and strong brown (7.5YR 5/8) lithochromic mottles; massive; friable; few very fine roots; 40 percent channers (50 percent shale and mudstone, 45 percent sandstone, 5 percent high-carbon material); moderately acid.

The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 60 percent, by volume, in the A horizon and from 35 to 60 percent, by volume, in the C horizon. The rock fragments are mainly mudstone, sandstone, and shale with small amounts of coal. The percentage of each is less than 65 percent of the total rock fragments in the control section. In unlimed areas reaction is moderately acid to neutral.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6. The texture of the fine-earth material is loam. The A horizon has weak or moderate, fine or medium granular structure and friable or very friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 1 to 8. The texture of the fine-earth material is loam or clay loam. The C horizon is massive and has firm, friable, or very friable consistence.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils that formed in acid material weathered from interbedded siltstone, shale, and sandstone. Gilpin soils are on ridgetops, benches, and side slopes throughout the county. Slope ranges from 8 to 70 percent.

Gilpin soils are on the landscape with the well drained Cedarcreek, Fairpoint, Itmann, Laidig, Lily, Pineville, and Upshur soils. Gilpin soils have a lower content of rock fragments in the control section than Cedarcreek, Fairpoint, and Itmann soils; have less sand in the B and C horizons than Lily soils and are generally underlain by siltstone or shale bedrock; are not so deep as Pineville and Laidig soils; and have less clay in the Bt horizon than Upshur soils.

Typical pedon of Gilpin silt loam, 35 to 70 percent slopes, in a wooded area of Gilpin-Upshur complex, 35 to 70 percent slopes, very stony; near the community of Floe; about 1,800 feet southwest of Floe; about 500 feet northeast of the Sears Cemetery; USGS Chloe topographic quadrangle; lat. 38 degrees 37 minutes 30 seconds N. and long. 81 degrees 01 minute 05 seconds W.

Oi—0 to 2 inches; slightly decomposed hardwood leaf litter.

Oe—2 to 3 inches; moderately decomposed hardwood leaf litter.

A—3 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 5 percent rock fragments; strongly acid; abrupt wavy boundary.

BA—6 to 10 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—10 to 23 inches; yellowish brown (10YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; friable; many fine, medium, and coarse roots; 10 percent rock fragments; few distinct clay films on faces of peds and in pores; very strongly acid; clear wavy boundary.
Bt2—23 to 29 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate medium subangular blocky structure; friable; many fine, medium, and coarse roots; 15 percent rock fragments; common distinct clay films on faces of peds and in pores; very strongly acid; clear wavy boundary.
C—29 to 37 inches; strong brown (7.5YR 5/6) channery silty clay loam; massive; friable; few fine, medium, and coarse roots; 30 percent rock fragments; extremely acid; clear wavy boundary.
R—37 inches; fractured, fine-grained sandstone.

The thickness of the solum ranges from 18 to 36 inches. The depth to bedrock ranges from 20 to 40 inches. The content of rock fragments ranges from 5 to 25 percent, by volume, in individual horizons of the solum and from 30 to 65 percent, by volume, in the C horizon. The rock fragments are shale, siltstone, and sandstone. In unlimed areas reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The texture of the fine-earth material is silt loam. The A horizon has weak or moderate, fine or medium granular structure and very friable or friable consistence.

The BA horizon has hue of 10YR, value of 4, and chroma of 3 or 4. The texture of the fine-earth material is silt loam. The BA horizon has weak or moderate, fine or medium subangular blocky structure and friable or very friable consistence.

The Bt horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 or 6. The texture of the fine-earth material is silt loam, loam, or silty clay loam. The Bt horizon has moderate fine or medium subangular blocky structure and friable consistence.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 or 6. The texture of the fine-earth material is loam, silt loam, or silty clay loam. The C horizon has friable consistence.

Itmann Series

The Itmann series consists of very deep, somewhat excessively drained soils that formed in acid waste material from deep-mined coal. Most areas are covered with as much as 20 inches of natural soil material from the surrounding area. Itmann soils are on ridgetops, benches, and hillsides, mostly around the Widen area. Slope ranges from 0 to 80 percent.

Itmann soils are on the landscape with the well drained Cedarcreek, Fairpoint, Gilpin, Laidig, Lily, and Pineville soils. Itmann soils have more carbolithic rock fragments throughout the profile than the associated soils.

Typical pedon of Itmann channery clay loam, very steep; in an area where mine spoil has been covered with topsoil; near Bonetown Gap; about 1,800 feet northeast of the confluence of Elm Creek with Robinson Fork; USGS Swandale topographic quadrangle; lat. 38 degrees 26 minutes 18 seconds N. and long. 80 degrees 53 minutes 18 seconds W.

A—0 to 12 inches; yellowish brown (10YR 5/4 and 5/6) channery clay loam; weak fine and medium subangular blocky structure with very fine and fine granular structure concentrated around roots; friable; many fine, medium, and coarse roots; 20 percent rock fragments (60 percent sandstone, 35 percent mudstone, 5 percent carbolith); mildly alkaline; abrupt wavy boundary.
C1—12 to 26 inches; black (10YR 2/1) extremely channery sandy loam; single grain; loose; common fine and medium roots; 65 percent rock fragments (75 percent

carbolith, 15 percent sandstone, 10 percent mudstone); very strongly acid; gradual wavy boundary.

C2—26 to 65 inches; black (10YR 2/1) very channery sandy loam with pockets of loamy sand; single grain; loose; 50 percent rock fragments (75 percent carbolith, 20 percent mudstone, 5 percent sandstone); very strongly acid.

The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 80 percent, by volume, throughout the profile but averages 35 percent or more in the particle-size control section. The fragments are carbolith, mudstone, and sandstone. Carbolith fragments make up more than 50 percent of the total content of rock fragments. In unlimed areas reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR and value and chroma of 4 to 6. The texture of the fine-earth material is clay loam. The A horizon has weak fine and medium subangular blocky structure and friable consistence.

The C horizon has hue of 10YR, value of 2, and chroma of 1. The texture of the fine-earth material is sandy loam. The C horizon has loose or very friable consistence.

Laidig Series

The Laidig series consists of very deep, well drained soils formed in acid colluvial material that moved downslope from soils on uplands. Laidig soils are on footslopes, benches, and mountain side slopes. Slope ranges from 15 to 60 percent.

Laidig soils are on the landscape with the well drained Allegheny, Cedarcreek, Fairpoint, Gilpin, Itmann, Lily, and Pineville soils. Laidig soils are deeper than Gilpin and Lily soils; have fewer rock fragments than Cedarcreek, Fairpoint, or Itmann soils; and have a fragipan, which is not typical of the Allegheny or Pineville soils.

Typical pedon of Laidig channery loam, 15 to 35 percent slopes, extremely stony, in a wooded area; about 2,000 feet south of the confluence of Big Branch with Lilly Fork; USGS Clay topographic quadrangle; lat. 38 degrees 24 minutes 26 seconds N. and long. 81 degrees 02 minutes 32 seconds W.

Oi—0 to 2 inches; slightly decomposed hardwood leaf litter.

Oe—2 to 3 inches; moderately decomposed hardwood leaf litter.

A—3 to 7 inches; dark brown (10YR 3/3) channery loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; very friable; many fine, medium, and coarse roots; 15 percent rock fragments; very strongly acid; abrupt wavy boundary.

BA—7 to 11 inches; dark yellowish brown (10YR 4/4) channery loam; weak fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; 15 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—11 to 27 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds and in pores; common fine, medium, and coarse roots; 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—27 to 42 inches; yellowish brown (10YR 5/4) channery loam; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds and in pores; common fine, medium, and coarse roots; 20 percent rock fragments; very strongly acid; abrupt wavy boundary.

Btx—42 to 65 inches; yellowish brown (10YR 5/4) channery loam; few medium light gray (2.5Y 7/2) iron depletions and strong brown (7.5YR 5/6) masses in which iron has accumulated; weak very coarse prismatic structure parting to weak

medium and coarse subangular blocky; brittle; very firm; few distinct clay films on faces of peds and in pores; few black concretions; 40 percent rock fragments; very strongly acid.

The thickness of the solum ranges from 50 to 80 inches. The depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 30 to 50 inches. The content of rock fragments ranges from 10 to 50 percent, by volume, in the A, BA, and Bt horizons and from 25 to 60 percent, by volume, in the Btx horizon. In unlimed areas reaction is extremely acid or very strongly acid.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3. The texture of the fine-earth material is loam. The A horizon has moderate fine or medium granular structure and very friable or friable consistence.

The BA horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The texture of the fine-earth material is loam. The BA horizon has weak or moderate, fine or medium subangular blocky structure and very friable or friable consistence.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 or 6. The texture of the fine-earth material is loam, silt loam, or clay loam. The Bt horizon has moderate medium or coarse subangular blocky structure and friable consistence.

The Btx horizon has hue of 10YR, value of 4 or 5, and chroma of 4 or 6. The texture of the fine-earth material is sandy loam or loam. The Btx horizon has weak or moderate very coarse prismatic structure and firm or very firm consistence.

Lily Series

The Lily series consists of moderately deep, well drained soils that formed in acid material weathered from interbedded sandstone and shale. Lily soils are on ridgetops and the upper side slopes throughout the county. Slope ranges from 8 to 35 percent.

Lily soils are on the landscape with the well drained Cedarcreek, Fairpoint, Gilpin, Itmann, Laidig, and Pineville soils. Lily soils have fewer rock fragments in the control section than Cedarcreek, Fairpoint, and Itmann soils; are typically underlain by hard sandstone bedrock and have more sand in the control section than Gilpin soils; and are not so deep as Pineville and Laidig soils.

Typical pedon of Lily loam, in a wooded area of Gilpin and Lily soils, 15 to 25 percent slopes; near the community of Elkhurst; about 110 feet southwest of County Road 22 and about 2.3 miles south of where the road crosses over the Elk River; USGS Elkhurst topographic quadrangle; lat. 38 degrees 25 minutes 22 seconds N. and long. 81 degrees 08 minutes 48 seconds W.

Oi—0 to 0.5 inch; slightly decomposed leaf litter.

Oe—0.5 inch to 2 inches; moderately decomposed leaf litter.

A/E—2 to 4 inches; mixed very dark gray (10YR 3/1), dark grayish brown (10YR 4/2), and brown (10YR 5/3) loam; weak fine granular structure; very friable; many very fine to coarse roots; 5 percent rock fragments; very strongly acid; clear wavy boundary.

BE—4 to 12 inches; yellowish brown (10YR 5/4) loam; weak fine and medium subangular blocky structure; friable; many very fine to coarse roots; 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—12 to 20 inches; mixed strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine to coarse roots; 5 percent rock fragments; few faint clay films on faces of peds and in pores; very strongly acid; clear wavy boundary.

Bt2—20 to 28 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 10 percent

rock fragments; common faint clay films on faces of peds and in pores; very strongly acid; gradual wavy boundary.

BC—28 to 32 inches; strong brown (7.5YR 5/6) channery sandy loam; weak medium and coarse subangular blocky structure; friable; few fine roots; 25 percent rock fragments; very strongly acid; abrupt smooth boundary.

R—32 inches; moderately weathered, hard sandstone.

The thickness of the solum ranges from 20 to 36 inches. The depth to bedrock ranges from 20 to 40 inches. The content of rock fragments ranges from 0 to 30 percent, by volume, in individual horizons of the solum within a depth of 24 inches to as much as 35 percent below a depth of 24 inches. The rock fragments are shale, siltstone, and sandstone. In unlimed areas reaction is extremely acid to strongly acid.

The A, A/E, and E horizons have hue of 10YR, value of 2 to 5, and chroma of 1 to 3. The texture of the fine-earth material is loam, silt loam, or sandy loam. These horizons have weak or moderate, fine or medium granular structure and very friable or friable consistence.

The BE or BA horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. The texture of the fine-earth material is loam or sandy loam. The BE and BA horizons have weak or moderate, fine or medium subangular blocky structure and friable or very friable consistence.

The Bt horizon has hue of 5YR, 7.5YR or 10YR; value of 4 to 6; and chroma of 4 to 8. The texture of the fine-earth material is loam, sandy clay loam, or clay loam. The Bt horizon has weak or moderate, fine or medium subangular blocky structure and friable or firm consistence.

The BC and C horizons have hue of 5YR, 7.5YR or 10YR; value of 4 to 6; and chroma of 4 to 8. The texture of the fine-earth material is sandy loam, sandy clay loam, fine sandy loam, clay loam, or loamy sand. The BC horizon has weak fine to coarse subangular blocky structure. The C horizon has friable consistence.

Pineville Series

The Pineville series consists of very deep, well drained soils that formed in acid material moved downslope from uplands. Pineville soils are in mountain coves and on side slopes. Slope ranges from 35 to 70 percent.

Pineville soils are on the landscape with the well drained Cedarcreek, Fairpoint, Gilpin, Itmann, Laidig, and Lily soils. Pineville soils have fewer rock fragments than Cedarcreek, Fairpoint, and Itmann soils; are deeper to bedrock than Gilpin and Lily soils; and do not have a fragipan, which is typical of Laidig soils.

Typical pedon of Pineville channery loam, in a wooded area of Pineville-Gilpin-Laidig association, very steep, extremely stony; about 1.9 miles south of the confluence of Lilly Fork with Buffalo Creek; USGS Clay topographic quadrangle; lat. 38 degrees 25 minutes 30 seconds N. and long. 81 degrees 03 minutes 17 seconds W.

Oi—0 to 1 inch; slightly decomposed hardwood leaf litter.

Oe—1 to 2 inches; moderately decomposed organic matter.

A—2 to 4 inches; very dark grayish brown (10YR 3/2) channery loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 15 percent rock fragments; very strongly acid; abrupt wavy boundary.

BA—4 to 10 inches; dark yellowish brown (10YR 4/4) channery loam; weak medium subangular blocky structure; friable; many fine, medium, and coarse roots; 15 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; many fine, medium, and coarse roots; few

faint clay films on faces of peds and in pores; 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—20 to 39 inches; yellowish brown (10YR 5/6) channery loam; moderate medium and coarse subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds and in pores; 30 percent rock fragments; extremely acid; clear wavy boundary.

Bt3—39 to 54 inches; yellowish brown (10YR 5/6) very channery loam; moderate medium and coarse subangular blocky structure; friable or firm; few fine and medium roots; few faint clay films on faces of peds and in pores; 35 percent rock fragments; extremely acid; gradual wavy boundary.

C—54 to 65 inches; yellowish brown (10YR 5/6) very channery loam; massive; firm; 35 percent rock fragments; extremely acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 10 to 45 percent in the A and B horizons and from 30 to 60 percent in the C horizon. In unlimed areas reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. The texture of the fine-earth material is loam or silt loam. The A horizon has moderate fine or medium granular structure and very friable or friable consistence.

The BA horizon has hue of 10YR, value of 4 to 6, and chroma of 4. The texture of the fine-earth material is loam. The BA horizon has weak fine or medium subangular blocky structure and friable consistence.

The Bt horizon has hue of 10YR, value of 4 to 6, and chroma of 4 to 8. The texture of the fine-earth material is loam or clay loam. The Bt horizon has weak or moderate, fine to coarse subangular blocky structure and friable or firm consistence.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8. The texture of the fine-earth material is loam or sandy loam. It has friable or firm consistence.

Pope Series

The Pope series consists of very deep, well drained soils that formed in alluvial material washed from acid soils on uplands. Pope soils are on flood plains, mostly along the Elk River, Lilly Fork, and Buffalo, Leatherwood, Middle, Sycamore, Porter, and Laurel Creeks. Slope ranges from 0 to 3 percent.

Pope soils are on the landscape with the well drained Allegheny, Chavies, Craigsville, and Sensabaugh soils. Pope soils have fewer rock fragments in the B and C horizons than Craigsville and Sensabaugh soils and have less clay in the B horizon than Allegheny and Chavies soils.

Typical pedon of Pope sandy loam, in a wooded area along Lilly Fork; about 3,500 feet northwest of the confluence of Lick Branch with Lilly Fork and about 5,500 feet southwest of the confluence of Sinnett Branch with Lilly Fork; USGS Clay topographic quadrangle; lat. 38 degrees 25 minutes 46 seconds N. and long. 81 degrees 03 minutes 17 seconds W.

Oi—0 to 1 inch; slightly decomposed hardwood leaf litter.

Ap—1 to 6 inches; brown (10YR 4/3) sandy loam; weak fine and medium granular structure; very friable; many fine, medium, and coarse roots; very strongly acid; abrupt smooth boundary.

BA—6 to 10 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; many fine, medium, and coarse roots; very strongly acid; clear wavy boundary.

Bw1—10 to 15 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium and coarse subangular blocky structure; very friable; many fine, medium, and coarse roots; 10 percent rock fragments; strongly acid; clear wavy boundary.

Bw2—15 to 36 inches; yellowish brown (10YR 5/6) sandy loam; weak medium and coarse subangular blocky structure; friable; many fine, medium, and coarse roots; very strongly acid; gradual wavy boundary.
C—36 to 65 inches; yellowish brown (10YR 5/6) sandy loam; massive; friable; very strongly acid.

The thickness of the solum ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 15 percent, by volume, in the A and Bw horizons and from 0 to 50 percent, by volume, in the C horizon. In unlimed areas reaction is extremely acid to strongly acid.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The texture of the fine-earth material is sandy loam or loam. The Ap horizon has weak or moderate, fine or medium granular structure and very friable or friable consistence.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 4 or 6. The texture of the fine-earth material is fine sandy loam, sandy loam, or loam. The Bw horizon has weak medium or coarse subangular blocky structure and very friable or friable consistence.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 4 or 6. The texture of the fine-earth material is loamy sand, sandy loam, or loam. The C horizon has very friable or friable consistence.

Sensabaugh Series

The Sensabaugh series consists of very deep, well drained soils formed in alluvial material that washed from lime-influenced, acid soils on uplands. Sensabaugh soils are on flood plains along secondary streams in the northern part of the county. Slope ranges from 0 to 3 percent.

Sensabaugh soils are on the landscape with the well drained Chavies, Craigsville, Pope, and Vandalia soils. Sensabaugh soils have more rock fragments throughout the profile than Chavies or Pope soils; have fewer rock fragments throughout the profile than Craigsville soils; and have less clay than Vandalia soils.

Typical pedon of Sensabaugh silt loam, in a pastured area; along Swimminghole Run; about 2,600 feet southwest of the confluence of Swimminghole Run and Big Otter Creek; USGS Ivydale topographic quadrangle; lat. 38 degrees 34 minutes 55 seconds N. and long. 81 degrees 03 minutes 03 seconds W.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; very friable; many fine, medium, and coarse roots; 10 percent rounded rock fragments; slightly acid; abrupt smooth boundary.
Bw1—9 to 20 inches; brown (7.5YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; many fine, medium, and coarse roots; 15 percent rounded rock fragments; neutral; clear wavy boundary.
Bw2—20 to 33 inches; brown (7.5YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; 25 percent rounded rock fragments; moderately acid; clear wavy boundary.
C—33 to 65 inches; brown (7.5YR 4/4) very gravelly loam; massive; friable; 45 percent rounded rock fragments; moderately acid.

The thickness of the solum ranges from 24 to 40 inches. The depth to bedrock is more than 60 inches. The content of rounded rock fragments ranges from 0 to 30 percent in the individual horizons of the solum and from 30 to 60 percent in the C horizon. In unlimed areas reaction is moderately acid to mildly alkaline.

The Ap horizon has hue of 5YR to 10YR and value and chroma of 3 or 4. The texture of the fine-earth material is silt loam or loam. The Ap horizon has weak or moderate, fine or medium granular structure and friable or very friable consistence.

The Bw horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 or 6. The texture of the fine-earth material is silt loam, loam, clay loam, or sandy clay loam. The Bw horizon has weak or moderate, fine, medium, or coarse subangular blocky structure and friable or very friable consistence.

The C horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. The texture of the fine-earth material is loam, clay loam, or sandy clay loam. The C horizon has friable or very friable consistence.

Udorthents

Udorthents are very shallow to very deep, well drained soils in areas that have been disturbed by road construction, urban development, and mining. In Clay County, these soils are in areas along highways and railroads, in areas around mining sites and construction sites, and in other areas that have been excavated or filled. Slope ranges from 0 percent in some areas to nearly vertical in cut areas.

A typical pedon for Udorthents is not given because the properties of these soils varies so widely. Bedrock is exposed in some areas, but in other areas it is at a depth of more than 60 inches. The rock fragments are mudstone, sandstone, or shale. They vary in size and number. These soils have hue of 5YR, 7.5YR, or 10YR; value of 3 to 6; and chroma of 2 to 8. The texture of the fine-earth material is silt loam, loam, silty clay loam, or clay loam. Reaction ranges from very strongly acid to neutral.

Upshur Series

The Upshur series consists of deep, well drained soils that formed in lime-influenced, acid material weathered from siltstone and shale. Upshur soils are on ridgetops, benches, and side slopes in the northern part of the county. Slope ranges from 8 to 70 percent.

Upshur soils are on the landscape with the well drained Gilpin and Vandalia soils. Upshur soils have more clay in the Bt horizon than Gilpin soils, and they have less sand in the particle-size control section than Vandalia soils.

Typical pedon of Upshur silt loam, 35 to 70 percent slopes, in a wooded area of Gilpin-Upshur complex, 35 to 70 percent slopes, very stony; along Murphy Fork; about 5,300 feet northwest of the confluence of Mill Run with Murphy Fork; USGS Ivydale topographic quadrangle; lat. 38 degrees 36 minutes 40 seconds N. and long. 81 degrees 04 minutes 30 seconds W.

Oi—0 to 2 inches; loose hardwood leaf litter.

Oe—2 to 3 inches; partially decomposed hardwood leaf litter.

A—3 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; 5 percent rock fragments; many fine, medium, and coarse roots; very strongly acid; abrupt wavy boundary.

BA—7 to 11 inches; reddish brown (5YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; 5 percent rock fragments; many fine, medium, and coarse roots; very strongly acid; clear wavy boundary.

Bt1—11 to 22 inches; red (2.5YR 4/6) silty clay; strong medium subangular blocky structure; firm; 5 percent rock fragments; many fine, medium, and coarse roots; many distinct clay films on faces of peds and in pores; moderately alkaline; clear wavy boundary.

Bt2—22 to 42 inches; dusky red (10R 3/4) clay; strong medium and coarse subangular blocky structure; firm; 10 percent rock fragments; common fine, medium, and coarse roots; many distinct clay films on faces of peds and in pores; moderately alkaline; clear wavy boundary.

C—42 to 65 inches; dusky red (10R 3/4) channery silty clay loam; massive; friable; 25 percent rock fragments; moderately alkaline; gradual wavy boundary.
Cr—65 inches; highly weathered, red shale.

The thickness of the solum ranges from 24 to 50 inches. The depth to bedrock ranges from 40 to 70 inches. The content of rock fragments ranges from 0 to 15 percent in individual horizons of the solum and from 10 to 45 percent in the C horizon. The rock fragments are shale and siltstone. In unlimed areas reaction is strongly acid or very strongly acid in the A horizon and very strongly acid to mildly alkaline in the B and C horizons.

The A horizon has hue of 10YR to 5YR, value of 2 to 4, and chroma of 2 or 4. The texture of the fine-earth material is silt loam. The A horizon has moderate or strong, fine or medium granular structure and friable or very friable consistence.

The Bt horizon has hue of 5YR to 10R, value of 3 or 4, and chroma of 4 or 6. The texture of the fine-earth material is silty clay or clay. The Bt horizon has moderate or strong, medium or coarse, angular or subangular blocky structure and friable or firm consistence.

The C horizon has hue of 5YR to 10R, value of 3 or 4, and chroma of 4 or 6. The texture of the fine-earth material is silt loam, silty clay loam, or clay. The C horizon has friable or firm consistence.

Vandalia Series

The Vandalia series consists of very deep, well drained soils that formed in lime-influenced, acid colluvial material moved downslope from soils on uplands. Vandalia soils are on colluvial fans, footslopes, and benches and along drainageways in the northern part of the county. Slope ranges from 15 to 35 percent.

Vandalia soils are on the landscape with the well drained Sensabaugh and Upshur soils. Vandalia soils have more clay in their B and C horizons than Sensabaugh soils and more sand in the particle-size control section than Upshur soils.

Typical pedon of Vandalia silt loam, 25 to 35 percent slopes, in an abandoned field that is reverting to woodland; along Murphy Fork; about 3,000 feet north of the confluence of Mill Run with Murphy Fork; about 3,400 feet southwest of Velvet Knob; USGS Ivydale topographic quadrangle; lat. 38 degrees 36 minutes 50 seconds N. and long. 81 degrees 03 minutes 38 seconds W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; strong medium granular structure; friable; many fine and medium roots; 5 percent rock fragments; strongly acid; abrupt smooth boundary.
Bt1—8 to 14 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; many fine and medium roots; 5 percent rock fragments; many distinct clay films on faces of peds; strongly acid; clear wavy boundary.
Bt2—14 to 28 inches; reddish brown (5YR 4/4) silty clay; strong medium and coarse subangular blocky structure; firm; many fine roots; 10 percent rock fragments; many distinct clay films on faces of peds; strongly acid; clear wavy boundary.
Bt3—28 to 44 inches; reddish brown (5YR 4/4) channery silty clay; moderate medium and coarse subangular blocky structure; firm; common fine roots; 15 percent rock fragments; common distinct clay films on faces of peds; moderately acid; clear wavy boundary.
C—44 to 65 inches; reddish brown (5YR 4/3) channery silty clay; common medium distinct strong brown (7.5YR 5/8) iron concentrations; massive; firm; 30 percent rock fragments; slightly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 5 to 15 percent in

the A horizon, from 5 to 40 percent in individual subhorizons of the BA horizon (if it occurs) and Bt horizon, and from 5 to 50 percent in the C horizon. The rock fragments are shale, siltstone, and some sandstone. In unlimed areas reaction is moderately acid to very strongly acid in the A, BA, and Bt horizons and strongly acid to neutral in the C horizon.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. The texture of the fine-earth material is silt loam. The Ap horizon has moderate or strong, fine or medium granular structure and friable consistence.

The Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6. The texture of the fine-earth material is silty clay loam or silty clay. The Bt horizon has moderate or strong, medium or coarse subangular blocky structure and friable or firm consistence.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6. The texture of the fine-earth material is silty clay loam or silty clay. The C horizon has friable or firm consistence.

Formation of the Soils

The origin and development of the soils in Clay County are explained in this section. The five major factors of soil formation are identified, and their influence on the soils in the county is described. Also, the morphology of the soils is related to horizon nomenclature, the processes involved in horizon development, and the geological characteristics of the county.

Factors of Soil Formation

The soils in Clay County formed as a result of the interaction of the five major factors of soil formation—parent material, time, climate, living organisms, and topography. Each factor modifies the effect of the others. Parent material, topography, and time have resulted in the major differences among the soils in the county. Climate and living organisms generally influence soil formation relatively uniformly throughout broad areas.

Parent Material, Time, and Climate

The character of the parent material strongly influences both the time required for soil formation and the characteristics of the soil that forms. The soils in Clay County formed in residuum, colluvium, and alluvium. They formed in material derived from interbedded shale, siltstone, or sandstone. For example, Upshur soils formed in material weathered from interbedded claystone shale and siltstone, and Lily soils formed in material weathered from sandstone.

Residuum refers to soil material formed by the physical and chemical weathering of geologic materials in place. Soils that formed in residuum are generally the oldest soils in the county. The formation of these soils has been limited by resistant rock, slope, and constant erosion.

Colluvium refers to soil material or rock fragments, or both, moved downslope over varying periods of time from areas of soils formed in residuum. It is in areas on footslopes, on side slopes, in coves, and at the head of drainageways. For example, Pineville soils, which formed in colluvium, are in the lower landscape positions, below the Gilpin and Lily soils, which formed in residuum.

Alluvium refers to soil material that has been washed from soils on uplands. It is in areas on low terraces and flood plains. The soil-forming processes have acted on the material on low terraces for a considerable amount of time. Chavies soils, which formed in alluvium and are on low terraces and high flood plains, exhibit more profile development than the Craigsville, Pope, and Sensabaugh soils, which also formed in alluvium but are generally on low flood plains. Craigsville, Pope, and Sensabaugh soils formed in relatively recent deposits of alluvial material. They are the youngest natural soils in Clay County.

The climate is relatively uniform throughout the survey area. So, while average rainfall and temperature are significant in soil formation, they do not vary sufficiently across the county to cause differences in soil development. A detailed description of climate is given in the section “General Nature of the County.” Aspect, exposure, and elevation affect soil development and properties but generally not sufficiently as to be

expressed as differing soil series in this county. Nonetheless, soils in coves and on north aspects where slope is more than 15 percent often have a higher content of organic carbon than soils in other landscape positions.

Living Organisms

All living organisms, including plants, animals, bacteria, fungi, and people, affect soil formation. The kinds and amounts of vegetation in the past are generally responsible for the content of organic matter and color of the surface layer and are partly responsible for the content of plant nutrients in the soil today. Earthworms and burrowing animals help to keep the soil open and porous, and they can have a significant impact on organic matter and plant nutrients. By moving soil to the surface and creating passages underground, they mix and translocate mineral and organic matter. Fungi and bacteria decompose organic matter, releasing plant nutrients.

Soil characteristics are disturbed when people clear vegetation, plow, mine, add fertilizer, mix some of the soil horizons, or move soil material and rocks from place to place. Soils have been disturbed on more than 17,500 acres in Clay County by the surface mining of coal. The process of excavation and mixing of original soils and underlying bedrock, followed by reclamation work, results in a newly formed soil with very little profile development. Fairpoint soils are very deep, nonacid soils that are a result of surface mining.

Topography

Topography affects soil formation by controlling the amount of water moving through the soil and the amount and rate of surface runoff. The topographic position of the soil on the landscape determines whether a soil forms in a depositional or erosional environment.

Large amounts of water move through gently sloping or strongly sloping soils. This action favors the formation of soils with a moderately developed or well developed profile. On steep and very steep mountain side slopes, less water moves through the soil profile and the amount and rate of surface runoff are greater. Thus, soil material may be washed away nearly as rapidly as it forms. The complex interaction of slope, runoff, and percolation over long periods of time and climate change gives rise to the patterns of soils formed in residuum, colluvium, and alluvium as they occur on the landscape.

The rugged mountain topography of this county favors the formation of flood plains, which progresses rather rapidly. The natural and human-accelerated erosion from the very steep uplands generates sediment, which forms alluvial soils where it is deposited. The resulting alluvial soils on flood plains are weakly developed because too little time has elapsed for the development of well defined soil horizons.

Morphology of the Soils

The results of the soil-forming processes are evident in the different layers, or horizons, in the soil profile. The profile extends from the surface downward to material that is relatively unaltered by the soil-forming processes. Most soils have three major horizons, called the A, B, and C horizons.

The A horizon is the surface layer. It generally has the maximum amount of organic matter in the profile, making it darker than the underlying horizons. It is the layer of maximum leaching, or eluviation, of clay and iron.

The B horizon underlies the A horizon and is commonly called the subsoil. It is characterized by blocky structure and is more firm and lighter in color than the A horizon. It is the layer of maximum accumulation, or illuviation, of clay, iron, aluminum, and other constituents leached from overlying layers.

The C horizon occurs below the A and B horizons. It is composed of weathered material that is little changed by the soil-forming processes.

Soil horizons are formed by the interaction of many processes. Some of the more important of these are the accumulation of organic matter; the leaching of soluble salts; the reduction, transport, and oxidation of iron and manganese; the formation and translocation of clay minerals; and the formation of soil structure. These processes have been taking place for thousands of years in many soils in the county.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone. The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Bajada. A broad alluvial slope extending from the base of a mountain range out into a basin and formed by coalescence of separate alluvial fans.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Carbolith. Dark sedimentary rocks that make a black or very dark (Munsell value of 3 or less) streak or powder. Carbolith include coal, bone coal, high-carbon shales, and high-carbon mudstone. In general, this material contains at least 25 percent carbonaceous matter oxidizable at 350 to 400 degrees C.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliquivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque. A semicircular, concave, bowllike area that has steep faces primarily resulting from glacial ice and snow abrasion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.
Coppice dune. A small dune of fine grained soil material stabilized around shrubs or small trees.
Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.
Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.
Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.
Cropping system. Growing crops according to a planned system of rotation and management practices.
Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.
Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.
Crown. The upper part of a tree or shrub, including the living branches and their foliage.
Cuesta. A hill or ridge that has a gentle slope on one side and a steep slope on the other; specifically, an asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.
Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.
Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.
Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.
Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.
Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.
Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.
Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.
Depth to rock (in tables). Bedrock is too near the surface for the specified use.
Desert pavement. On a desert surface, a layer of gravel or larger fragments that was emplaced by upward movement of the underlying sediments or that remains after finer particles have been removed by running water or the wind.
Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.
Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic).—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated).—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.
Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.
Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.
Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.
Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.
Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the Earth's surface.
Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.
Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.
Fast intake (in tables). The rapid movement of water into the soil.
Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.
Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.
Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.
Fine earth. That portion of the soil consisting of particles less than 2 millimeters in diameter. Particles and rock fragments 2 millimeters in diameter or larger are not included.
Fine textured soil. Sandy clay, silty clay, or clay.
Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.
First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.
Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.
Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.
Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.
Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.
Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.
Footslope. The inclined surface at the base of a hill.
Forb. Any herbaceous plant not a grass or a sedge.
Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Lithochromic mottles. Mottles that have colors derived from the parent rocks.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Mine soil. A relatively young soil formed in earthy materials in areas where coal has been deep mined or surface mined.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outslope. The exposed area sloping down and away from the bench section of a surface mine.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with a relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it

is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8

Moderately alkaline .... 7.9 to 8.4
Strongly alkaline .... 8.5 to 9.0
Very strongly alkaline .... 9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the Earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Silviculture. A branch of forestry dealing with the maintenance and development of forests for the sustained production of forest products.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 3 percent
Gently sloping	3 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 35 percent
Very steep	35 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the Earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.
Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.
Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.
Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.
Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.
Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.
Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.
Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.
Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.
Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.
Weathering. All physical and chemical changes produced in rocks or other deposits at or near the Earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.
Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.
Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.
Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Temperature data recorded in the period 1964-90 at the Corton Weather Station and precipitation data recorded in the period 1961-90 at Clay, West Virginia)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snow-fall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January--	42.7	22.1	32.4	71	-9	47	3.24	2.00	4.36	8	10.8
February-	47.3	23.6	35.4	75	-4	69	3.08	1.93	4.11	8	7.3
March----	59.5	31.3	45.4	84	7	225	3.94	2.69	5.08	8	2.6
April----	69.8	39.4	54.6	89	19	434	3.97	2.60	5.22	9	.5
May------	77.9	48.5	63.2	91	27	718	4.29	2.63	5.78	8	.0
June-----	83.3	57.1	70.2	94	38	889	3.77	2.23	5.14	8	.0
July-----	86.4	62.4	74.4	97	47	1,042	4.57	3.13	5.89	8	.0
August---	84.8	61.3	73.1	95	46	1,013	4.48	3.00	5.84	7	.0
September	79.2	55.2	67.2	92	36	808	3.72	2.30	4.99	6	.0
October--	69.0	43.6	56.3	84	23	496	3.14	1.64	4.45	6	.2
November-	58.7	34.8	46.7	80	13	237	3.73	2.30	5.01	8	.7
December-	48.7	27.6	38.2	75	3	102	3.71	2.19	5.06	8	4.3
Yearly:											
Average	67.3	42.3	54.8	---	---	---	---	---	---	---	---
Extreme	---	---	---	97	-9	---	---	---	---	---	---
Total--	---	---	---	---	---	6,082	45.62	40.41	50.67	92	26.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1964-90 at the Corton Weather Station in West Virginia)

Probability	Temperature		
	24^{o} F or lower	28^{o} F or lower	32^{o} F or lower
Last freezing temperature in spring:			
1 year in 10 later than	Apr. 20	May 9	May 20
2 years in 10 later than	Apr. 15	May 4	May 14
5 years in 10 later than	Apr. 5	Apr. 23	May 4
First freezing temperature in fall:			
1 year in 10 earlier than	Oct. 17	Oct. 8	Sept. 29
2 years in 10 earlier than	Oct. 23	Oct. 13	Oct. 5
5 years in 10 earlier than	Nov. 4	Oct. 25	Oct. 18

Table 3.--Growing Season

(Recorded in the period 1964-90 at the Corton Weather Station in West Virginia)

Probability	Daily minimum temperature during growing season		
	Higher than 24^{o} F	Higher than 28^{o} F	Higher than 32^{o} F
	Days	Days	Days
9 years in 10	186	160	141
8 years in 10	194	167	150
5 years in 10	210	181	167
2 years in 10	226	195	185
1 year in 10	234	202	194

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AgB	Allegheny loam, 3 to 8 percent slopes	68	*
CeF	Cedarcreek very channery loam, very steep, very stony	247	0.1
Ch	Chavies fine sandy loam	1,299	0.6
FpF	Fairpoint channery loam, very steep, very stony	1,467	0.7
GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony	3,021	1.4
GuC	Gilpin-Upshur complex, 8 to 15 percent slopes	281	0.1
GuD	Gilpin-Upshur complex, 15 to 25 percent slopes	6,200	2.8
GuE	Gilpin-Upshur complex, 25 to 35 percent slopes	6,899	3.1
GxF	Gilpin-Upshur complex, 35 to 70 percent slopes, very stony	32,002	14.4
GyC	Gilpin and Lily soils, 8 to 15 percent slopes	629	0.3
GyD	Gilpin and Lily soils, 15 to 25 percent slopes	12,831	5.8
GyE	Gilpin and Lily soils, 25 to 35 percent slopes	6,010	2.7
ItF	Itmann channery clay loam, very steep	219	*
LaE	Laidig channery loam, 15 to 35 percent slopes, extremely stony	10,110	4.6
PGF	Pineville-Gilpin-Laidig association, very steep, extremely stony	130,884	59.0
Po	Pope sandy loam	1,145	0.5
Px	Pope-Craigsville complex	2,837	1.3
Ss	Sensabaugh silt loam	1,301	0.6
Ud	Udorthents, smoothed	733	0.3
VaD	Vandalia silt loam, 15 to 25 percent slopes	328	0.1
VaE	Vandalia silt loam, 25 to 35 percent slopes	2,267	1.0
W	Water	922	0.4
	Total	221,700	100.0

* Less than 0.1 percent.

Table 5.—Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grass-legume hay	Kentucky bluegrass	Wheat
		Tons	Bu	Tons	AUM	Bu
AgB: Allegheny	2e	5.00	115.00	3.50	5.00	45.00
CeF: Cedarcreek	7s	---	---	---	---	---
Ch: Chavies	1	5.50	120.00	4.00	5.50	50.00
FpF: Fairpoint	7s	---	---	---	---	---
GaF: Gilpin	7s	---	---	---	---	---
GuC:						
Gilpin	3e	3.50	85.00	3.00	4.50	35.00
Upshur	4e	4.00	90.00	3.00	4.50	35.00
GuD:						
Gilpin	4e	3.00	80.00	2.50	4.00	30.00
Upshur	6e	---	75.00	---	4.00	30.00
GuE:						
Gilpin	6e	---	---	---	---	---
Upshur	7e	---	---	---	---	---
GxF:						
Gilpin	7s	---	---	---	---	---
Upshur	7s	---	---	---	---	---
GyC:						
Gilpin	3e	3.50	85.00	3.00	4.50	35.00
Lily	3e	---	85.00	3.00	---	35.00
GyD:						
Gilpin	4e	3.00	80.00	2.50	4.00	30.00
Lily	4e	---	---	---	---	---
GyE:						
Gilpin	6e	---	---	---	---	---
Lily	6e	---	---	---	---	---
ItF: Itmann	7s	---	---	---	---	---
LaE: Laidig	7s	---	---	---	---	---
PGF:						
Pineville	7s	---	---	---	---	---

Table 5.—Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grass-legume hay	Kentucky bluegrass	Wheat
		Tons	Bu	Tons	AUM	Bu
PGF:						
Gilpin	7s	---	---	---	---	---
Laidig	7s	---	---	---	---	---
Po Pope	2w	4.50	110.00	3.00	4.50	40.00
Px:						
Pope	2w	2.50	80.00	3.00	3.50	30.00
Craigsville	2w	2.50	80.00	2.00	4.50	35.00
Ss Sensabaugh	2w	5.50	125.00	4.00	5.50	50.00
Ud Udorthents	---	---	---	---	---	---
VaD Vandalia	4e	4.00	90.00	2.50	4.00	30.00
VaE Vandalia	6e	---	---	---	3.50	---

Table 6.--Acreage by Capability Class and Subclass

Capability class	Capability subclass	Acreage
Unclassified	---	5,578
1	---	1,299
2	e	68
2	w	5,283
3	e	769
4	e	16,033
6	e	12,552
7	e	2,415
7	s	177,703

Table 7.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
AgB	Allegheny loam, 3 to 8 percent slopes
Ch	Chavies fine sandy loam
Po	Pope sandy loam
Px	Pope-Craigsville complex
Ss	Sensabaugh silt loam

Table 8.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber
							m^3/ha
AgB------------- Allegheny	Slight	Slight	Slight	Severe	Northern red oak----	80	4
					Yellow-poplar-------	93	7
					Black oak-----------	78	4
					Shortleaf pine------	80	9
					Virginia pine-------	72	8
					Red maple-----------	---	---
					Sugar maple---------	---	---
					Pignut hickory------	---	---
					White ash-----------	---	---
					American elm--------	---	---
CeF------------- Cedarcreek	Severe	Severe	Severe	Moderate	Northern red oak----	80	4
					American sycamore---	90	7
					Black locust--------	---	---
					Eastern white pine--	94	12
					Tuliptree-----------	105	8
Ch-------------- Chavies	Slight	Slight	Slight	Severe	Northern red oak----	80	---
					American sycamore---	---	---
					Black cherry--------	---	---
					Black walnut--------	---	---
					Hickory-------------	---	---
					Red maple-----------	---	---
					Shortleaf pine------	76	8
					Sugar maple---------	---	---
					Tuliptree-----------	93	7
					White oak-----------	---	---
FpF------------- Fairpoint	Severe	Severe	Severe	Moderate	--------------------	---	---
GaF------------- Gilpin	Severe	Severe	Slight	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7
GuC:							
Gilpin---------	Slight	Slight	Slight	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7
Upshur---------	Moderate	Moderate	Slight	Moderate	Northern red oak----	65	3
					Virginia pine-------	66	7
					Eastern white pine--	80	10
					Tuliptree-----------	80	5
GuD:							
Gilpin---------	Moderate	Moderate	Moderate	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7
Upshur---------	Moderate	Severe	Slight	Moderate	Northern red oak----	70	4
					Virginia pine-------	70	8
					Eastern white pine--	90	12
					Tuliptree-----------	90	6
GuE:							
Gilpin---------	Moderate	Moderate	Moderate	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber
							m^3/ha
GuE:							
Upshur----------	Severe	Severe	Slight	Moderate	Northern red oak----	70	4
					Virginia pine-------	70	8
					Eastern white pine--	90	12
					Tuliptree-----------	90	6
GxF:							
Gilpin----------	Severe	Severe	Slight	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7
Upshur----------	Severe	Severe	Slight	Moderate	Northern red oak----	70	4
					Virginia pine-------	70	8
					Eastern white pine--	90	12
					Tuliptree-----------	90	6
GyC:							
Gilpin----------	Slight	Slight	Slight	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7
Lily------------	Slight	Slight	Slight	Moderate	Northern red oak----	78	---
					Virginia pine-------	80	8
					Black oak-----------	78	---
					Chestnut oak--------	73	---
					Scarlet oak---------	77	3
					Shortleaf pine------	63	7
					Tuliptree-----------	95	---
					White oak-----------	73	4
GyD:							
Gilpin----------	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7
Lily------------	Moderate	Moderate	Slight	Moderate	Northern red oak----	78	---
					Virginia pine-------	80	8
					Black oak-----------	78	---
					Chestnut oak--------	73	---
					Scarlet oak---------	77	3
					Shortleaf pine------	63	7
					Tuliptree-----------	95	---
					White oak-----------	73	4
GyE:							
Gilpin----------	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7
Lily------------	Moderate	Moderate	Slight	Moderate	Northern red oak----	78	---
					Virginia pine-------	80	8
					Black oak-----------	78	---
					Chestnut oak--------	73	---
					Scarlet oak---------	77	3
					Shortleaf pine------	63	7
					Tuliptree-----------	95	---
					White oak-----------	73	4
ItF------------- Itmann	Severe	Severe	Severe	Slight	Virginia pine-------	---	---
					Black locust--------	---	---
					Eastern white pine--	---	---
					Red maple-----------	---	---
					Shortleaf pine------	---	---
					Sweet birch---------	---	---

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns				Potential productivity		
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume of wood fiber
							m^3/ha
LaE------------- Laidig	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	4
					White oak-----------	80	4
					Yellow-poplar-------	90	6
					White ash-----------	80	4
					Sugar maple---------	80	4
					Black cherry--------	80	4
					Black locust--------	80	---
PGF:							
Pineville------	Severe	Severe	Slight	Moderate	Northern red oak----	86	5
					Basswood------------	---	---
					Black oak-----------	85	4
					Hickory-------------	---	---
					Tuliptree-----------	108	8
Gilpin---------	Severe	Severe	Slight	Moderate	Northern red oak----	80	4
					Tuliptree-----------	95	7
Laidig---------	Severe	Severe	Slight	Moderate	Northern red oak----	80	4
					White oak-----------	80	4
					Yellow-poplar-------	90	6
					White ash-----------	80	4
					Sugar maple---------	80	4
					Black cherry--------	80	4
					Black locust--------	80	---
Po-------------- Pope	Slight	Slight	Slight	Severe	American basswood---	---	---
					American beech------	---	---
					American sycamore---	---	---
					Bitternut hickory---	---	---
					Blackgum------------	---	---
					Eastern hemlock-----	---	---
					Northern red oak----	---	---
					Tuliptree-----------	96	7
					White oak-----------	80	4
Px:							
Pope-----------	Slight	Slight	Slight	Severe	Northern red oak----	80	---
					American basswood---	---	---
					American beech------	---	---
					American sycamore---	---	---
					Bitternut hickory---	---	---
					Blackgum------------	---	---
					Eastern hemlock-----	---	---
					Tuliptree-----------	96	7
					White oak-----------	80	4
Craigsville----	Slight	Slight	Moderate	Moderate	Virginia pine-------	80	8
					Eastern white pine--	90	12
					Northern red oak----	80	4
					Tuliptree-----------	95	7
Ss-------------- Sensabaugh	Slight	Slight	Slight	Severe	White oak-----------	80	4
					Virginia pine-------	75	8
					Shortleaf pine------	80	9
					Tuliptree-----------	100	8

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns				Potential productivity		
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume of wood fiber
							m^3/ha
VaD------------- Vandalia	Moderate	Severe	Slight	Severe	Northern red oak----	77	4
					Virginia pine-------	80	8
					Tuliptree-----------	90	6
VaE------------- Vandalia	Severe	Severe	Slight	Severe	Northern red oak----	77	4
					Virginia pine-------	80	8
					Tuliptree-----------	90	6

Table 9.--Recreational Development

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AgB:					
Allegheny-------	Slight	Slight	Moderate: slope small stones	Slight	Slight
CeF:					
Cedarcreek------	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies
Ch:					
Chavies---------	Severe: flooding	Slight	Moderate: small stones	Slight	Slight
FpF:					
Fairpoint-------	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope	Severe: slope
GaF:					
Gilpin----------	Severe: slope small stones	Severe: slope small stones	Severe: large stones slope small stones	Severe: slope	Severe: large stones slope small stones
GuC:					
Gilpin----------	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate slope
Upshur----------	Moderate: percs slowly slope	Moderate: percs slowly slope	Severe: slope	Severe: erodes easily	Moderate: slope
GuD:					
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Upshur----------	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
GuE:					
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GuE:					
Upshur----------	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope
GxF:					
Gilpin----------	Severe: slope small stones	Severe: slope small stones	Severe: large stones slope small stones	Severe: slope	Severe: large stones slope small stones
Upshur----------	Severe: slope	Severe: slope	Severe: large stones	Severe: slope	Severe: slope
GyC:					
Gilpin----------	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Lily------------	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope depth to rock
GyD:					
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Lily------------	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
GyE:					
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Lily------------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
ItF:					
Itmann----------	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies
LaE:					
Laidig----------	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope small stones	Severe: slope	Severe: slope

Table 9.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
PGF:					
Pineville-------	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: slope
Gilpin----------	Severe: slope small stones	Severe: slope small stones	Severe: large stones slope small stones	Severe: slope	Severe: large stones slope small stones
Laidig----------	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope small stones	Severe: slope	Severe: slope
Po:					
Pope------------	Severe: flooding	Slight	Moderate: flooding small stones	Slight	Moderate: flooding
Px:					
Pope------------	Severe: flooding	Slight	Moderate: flooding small stones	Slight	Moderate: flooding
Craigsville-----	Severe: flooding	Moderate: small stones	Severe: small stones	Slight	Moderate: large stones small stones
Ss:					
Sensabaugh------	Severe: flooding	Slight	Moderate: small stones	Slight	Moderate: flooding
Ud:					
Udorthents------	---	---	---	---	---
VaD:					
Vandalia--------	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
VaE:					
Vandalia--------	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope

Table 10.--Wildlife Habitat

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AgB:										
Allegheny	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CeF:										
Cedarcreek	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Ch:										
Chavies	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Poor
FpF:										
Fairpoint	Very poor	Very poor	Poor	Poor	Poor	Very poor	Very poor	Very poor	Poor	Very poor
GaF:										
Gilpin	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
GuC:										
Gilpin	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Upshur	Fair	Good	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
GuD:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Upshur	Poor	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
GuE:										
Gilpin	Very poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Upshur	Very poor	Fair	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
GxF:										
Gilpin	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Upshur	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Very poor	Fair	Very poor
GyC:										
Gilpin	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
Lily	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
GyD:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Lily	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
GyE:										
Gilpin----------	Very poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Lily-----------	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
ItF:										
Itmann----------	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
LaE:										
Laidig----------	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
PGF:										
Pineville-------	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Gilpin----------	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Laidig----------	Very poor	Very poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Po:										
Pope-----------	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Px:										
Pope-----------	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Craigsville-----	Poor	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor
Ss:										
Sensabaugh------	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Ud:										
Udorthents------	---	---	---	---	---	---	---	---	---	---
VaD:										
Vandalia--------	Poor	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
VaE:										
Vandalia--------	Very poor	Fair	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor

Table 11.--Building Site Development

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AgB:						
Allegheny-------	Slight	Slight	Slight	Moderate: slope	Slight	Slight
CeF:						
Cedarcreek------	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies
Ch:						
Chavies---------	Slight	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding	Slight
FpF:						
Fairpoint-------	Severe: slope.	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope
GaF:						
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope small stones
GuC:						
Gilpin----------	Moderate: slope depth to rock	Moderate: slope	Moderate: slope depth to rock	Severe: slope	Moderate: frost action slope	Moderate slope
Upshur----------	Moderate: slope too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell slope slippage	Severe: low strength shrink-swell	Moderate: slope
GuD:						
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Upshur----------	Severe: slope slippage	Severe: shrink-swell slope slippage	Severe: shrink-swell slope slippage	Severe: shrink-swell slope slippage	Severe: low strength shrink-swell slope	Severe: slope

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GuE:						
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Upshur----------	Severe: slope slippage	Severe: shrink-swell slope slippage	Severe: shrink-swell slope slippage	Severe: shrink-swell slope slippage	Severe: low strength shrink-swell slope	Severe: slope
GxF:						
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope small stones
Upshur----------	Severe: slope slippage	Severe: shrink-swell slope slippage	Severe: shrink-swell slope slippage	Severe: shrink-swell slope slippage	Severe: low strength shrink-swell slope	Severe: slope
GyC:						
Gilpin----------	Moderate: slope depth to rock	Moderate: slope	Moderate: slope depth to rock	Severe: slope	Moderate: frost action slope	Moderate slope
Lily------------	Severe: depth to rock	Moderate: slope depth to rock	Severe: depth to rock	Severe: slope	Moderate: slope depth to rock	Moderate: slope depth to rock
GyD:						
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Lily------------	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope
GyE:						
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Lily------------	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope
ItF:						
Itmann----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Limitation: varies

Table 11.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LaE:						
Laidig----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
PGF:						
Pineville-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Gilpin----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope small stones
Laidig----------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Po:						
Pope------------	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
Px:						
Pope------------	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
Craigsville-----	Severe: large stones cutbanks cave	Severe: flooding large stones	Severe: flooding large stones	Severe: flooding large stones	Severe: flooding large stones	Moderate: large stones small stones
Ss:						
Sensabaugh------	Moderate: flooding wetness	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
Ud:						
Udorthents------	---	---	---	---	---	---
VaD:						
Vandalia--------	Severe: slope	Severe: shrink-swell slope	Severe: shrink-swell slope	Severe: shrink-swell slope	Severe: low strength shrink-swell slope	Severe: slope
VaE:						
Vandalia--------	Severe: slope	Severe: shrink-swell slope	Severe: shrink-swell slope	Severe: shrink-swell slope	Severe: low strength shrink-swell slope	Severe: slope

Table 12.--Sanitary Facilities

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AgB:					
Allegheny-------	Slight	Moderate: seepage slope	Moderate: too clayey	Slight	Fair: too clayey
CeF:					
Cedarcreek------	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies
Ch:					
Chavies---------	Moderate: flooding	Severe: seepage	Severe: seepage	Severe: seepage	Good
FpF:					
Fairpoint-------	Severe: percs slowly slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Severe: slope unstable fill	Poor: slope small stones
GaF:					
Gilpin----------	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope small stones depth to rock
GuC:					
Gilpin----------	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: area reclaim thin layer
Upshur----------	Severe: percs slowly	Severe: slope	Severe: too clayey depth to rock	Moderate: slope depth to rock	Poor: hard to pack too clayey
GuD:					
Gilpin----------	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: area reclaim slope thin layer
Upshur----------	Severe: percs slowly slope slippage	Severe: slope	Severe: slope too clayey depth to rock	Severe: slope slippage	Poor: hard to pack slope too clayey

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GuE:					
Gilpin----------	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: area reclaim slope thin layer
Upshur----------	Severe: percs slowly slope slippage	Severe: slope	Severe: slope too clayey depth to rock	Severe: slope slippage	Poor: hard to pack slope too clayey
GxF:					
Gilpin----------	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope small stones depth to rock
Upshur----------	Severe: percs slowly slope slippage	Severe: slope	Severe: slope too clayey depth to rock	Severe: slope slippage	Poor: hard to pack slope too clayey
GyC:					
Gilpin----------	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: area reclaim thin layer
Lily------------	Severe: depth to rock	Severe: seepage slope depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: depth to rock
GyD:					
Gilpin----------	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: area reclaim slope thin layer
Lily------------	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GyE:					
Gilpin	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: area reclaim slope thin layer
Lily	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
ItF:					
Itmann	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies	Limitation: varies
LaE:					
Laidig	Severe: percs slowly slope wetness	Severe: seepage slope wetness	Severe: slope	Severe: seepage slope	Poor: slope small stones
PGF:					
Pineville	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Severe: slope
Gilpin	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope small stones depth to rock
Laidig	Severe: percs slowly slope wetness	Severe: seepage slope wetness	Severe: slope	Severe: seepage slope	Poor: slope small stones
Po:					
Pope	Severe: flooding	Severe: flooding seepage	Severe: flooding seepage	Severe: flooding seepage	Good
Px:					
Pope	Severe: flooding	Severe: flooding seepage	Severe: flooding seepage	Severe: flooding seepage	Good

Table 12.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Px:					
Craigsville-----	Severe: flooding large stones poor filter	Severe: flooding large stones seepage	Severe: flooding large stones seepage	Severe: flooding seepage	Poor: large stones seepage
Ss:					
Sensabaugh------	Severe: flooding	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding seepage	Poor: small stones
Ud:					
Udorthents------	---	---	---	---	---
VaD:					
Vandalia--------	Severe: percs slowly slope slippage	Severe: slope slippage	Severe: slope too clayey slippage	Severe: slope slippage	Poor: hard to pack slope too clayey
VaE:					
Vandalia--------	Severe: percs slowly slope slippage	Severe: slope slippage	Severe: slope too clayey slippage	Severe: slope	Poor: hard to pack slope too clayey

Table 13.--Construction Materials

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AgB:				
Allegheny	Good	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim small stones
CeF:				
Cedarcreek	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Ch:				
Chavies	Good	Improbable: excess fines	Improbable: excess fines	Good
FpF:				
Fairpoint	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
GaF:				
Gilpin	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
GuC:				
Gilpin	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
Upshur	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
GuD:				
Gilpin	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Upshur	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
GuE:				
Gilpin----------	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Upshur----------	Poor: low strength shrink-swell slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
GxF:				
Gilpin----------	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Upshur----------	Poor: low strength shrink-swell slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
GyC:				
Gilpin----------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
Lily------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim small stones
GyD:				
Gilpin----------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Lily------------	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope
GyE:				
Gilpin----------	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Lily------------	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
ItF:				
Itmann----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
LaE:				
Laidig----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
PGF:				
Pineville-------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Severe: slope small stones
Gilpin----------	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Laidig----------	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Po:				
Pope------------	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim
Px:				
Pope------------	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim
Craigsville-----	Poor: large stones	Improbable: large stones	Improbable: large stones	Poor: area reclaim large stones
Ss:				
Sensabaugh------	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones
Ud:				
Udorthents------	---	---	---	---

Table 13.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
VaD:				
Vandalia--------	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones too clayey
VaE:				
Vandalia--------	Poor: low strength shrink-swell slope	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones too clayey

Table 14.--Water Management

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AgB: Allegheny-------	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Favorable	Favorable
CeF: Cedarcreek------	Severe: seepage slope	Moderate: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
Ch: Chavies---------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: soil blowing	Limitation: soil blowing	Favorable
FpF: Fairpoint-------	Severe: slope	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope
GaF: Gilpin----------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
GuC: Gilpin----------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Upshur----------	Severe: slope slippage	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope
GuD: Gilpin----------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
GuD:							
Upshur----------	Severe: slope slippage	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope
GuE:							
Gilpin----------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Upshur----------	Severe: slope slippage	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope
GxF:							
Gilpin----------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Upshur----------	Severe: slope slippage	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope
GyC:							
Gilpin----------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Lily------------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
GyD:							
Gilpin----------	Severe: slope	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
GyD:							
Lily------------	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
GyE:							
Gilpin----------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Lily------------	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
ItF:							
Itmann----------	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope	Limitation: erodes easily slope
LaE:							
Laidig----------	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: large stones slope wetness	Limitation: large stones slope droughty
PGF:							
Pineville-------	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
PGF:							
Gilpin----------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Laidig----------	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: large stones slope wetness	Limitation: large stones slope droughty
Po:							
Pope------------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Favorable	Favorable

Table 14.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Px:							
Pope------------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Favorable	Favorable	Favorable
Craigsville-----	Severe: seepage	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones droughty	Limitation: large stones too sandy soil blowing	Limitation: large stones droughty
Ss:							
Sensabaugh------	Severe: seepage	Moderate: large stones	Moderate: slow refill deep to water	Limitation: deep to water	Limitation: flooding	Limitation: large stones	Limitation: large stones
Ud:							
Udorthents------	---	---	---	---	---	---	---
VaD:							
Vandalia--------	Severe: slope	Moderate: hard to pack piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope
VaE:							
Vandalia--------	Severe: slope	Moderate: hard to pack piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope	Limitation: erodes easily percs slowly slope

Table 15.--Engineering Index Properties

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
AgB:												
Allegheny-------	0-9	Loam	CL, ML	A-4	0	0	90-100	80-100	65-100	55-95	15-35	NP-10
	9-49	Clay loam, loam, sandy clay loam	CL, ML, SC, SM	A-4, A-6	0	0	90-100	80-100	65-95	35-80	15-35	NP-15
	49-65	Clay loam, sandy loam, gravelly sandy loam	CL, GC, ML, SM	A-1, A-2, A-4, A-6	---	0-5	65-100	55-100	35-95	20-75	15-35	NP-15
CeF:												
Cedarcreek------	0-10	Very channery loam	GC	A-2, A-4, A-6	---	15-30	45-60	40-55	30-50	20-40	25-35	7-12
	10-65	Very channery loam, extremely channery loam, very channery sandy loam	GC	A-2, A-4	---	5-30	30-55	25-50	20-45	15-40	25-35	7-12
Ch:												
Chavies---------	0-9	Fine sandy loam	CL-ML, ML, SC-SM, SM	A-4	0	0	85-100	75-100	40-90	40-75	0-25	NP-5
	9-57	Fine sandy loam, loam	ML, SM	A-4	0	0	85-100	75-100	65-100	45-85	0-35	NP-8
	57-65	Fine sandy loam, loam, gravelly sandy loam	CL-ML, ML, SC-SM, SM	A-1-b, A-2, A-4	---	0-5	70-100	60-95	40-85	20-75	0-25	NP-5
FpF:												
Fairpoint-------	0-4	Channery loam	CL-ML, GC-GM, GM, ML	A-4, A-6	---	0-15	65-90	55-80	50-80	35-75	25-40	4-14
	4-65	Very channery clay loam, channery loam	CL, CL-ML, GC, SC	A-2, A-4, A-6, A-7	---	15-30	55-75	25-65	20-65	15-60	25-50	4-24

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
GaF:												
Gilpin----------	0-10	Very stony silt loam	CL, CL-ML, GC, SC	A-2, A-4, A-6	---	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	CL, CL-ML, GC-GM, SC	A-2, A-4, A-5	---	0-30	50-95	45-90	35-85	30-80	20-41	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC, GC-GM	A-1, A-2, A-4, A-5	---	0-35	25-55	20-50	15-45	15-40	20-41	4-15
	37-47	Unweathered bedrock			---	---	---	---	---	---	---	---
GuC:												
Gilpin----------	0-10	Silt loam	CL, CL-ML	A-4, A-6	---	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	CL, CL-ML, GC, SC	A-2, A-4, A-6	---	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC, GC-GM	A-1, A-2, A-4, A-6	---	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	37-47	Unweathered bedrock			---	---	---	---	---	---	---	---
Upshur----------	0-11	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	85-100	65-90	25-40	5-15
	11-42	Silty clay, clay	CH, CL, MH	A-7	0	0	95-100	95-100	90-100	85-100	45-70	20-40
	42-65	Channery silty clay loam, silty clay, clay	CH, CL, MH, ML	A-6, A-7	0	0	80-100	65-100	60-100	55-95	35-55	11-25
	65-75	Weathered bedrock			---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
GuD:												
Gilpin----------	0-10	Silt loam	CL, CL-ML	A-4, A-6	---	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	CL, CL-ML, GC, SC	A-2, A-4, A-6	---	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC, GC-GM	A-1, A-2, A-4, A-6	---	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	37-47	Unweathered bedrock			---	---	---	---	---	---	---	---
Upshur----------	0-11	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	85-100	65-90	25-40	5-15
	11-42	Silty clay, clay	CH, CL, MH	A-7	0	0	95-100	95-100	90-100	85-100	45-70	20-40
	42-65	Channery silty clay loam, silty clay, clay	CH, CL, MH, ML	A-6, A-7	0	0	80-100	65-100	60-100	55-95	35-55	11-25
	65-75	Weathered bedrock			---	---	---	---	---	---	---	---
GuE:												
Gilpin----------	0-10	Silt loam	CL, CL-ML	A-4, A-6	---	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	CL, CL-ML, GC, SC	A-2, A-4, A-6	---	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC, GC-GM	A-1, A-2, A-4, A-6	---	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	37-47	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
GuE:												
Upshur----------	0-11	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	85-100	65-90	25-40	5-15
	11-42	Silty clay, clay	CH, CL, MH	A-7	0	0	95-100	95-100	90-100	85-100	45-70	20-40
	42-65	Channery silty clay loam, silty clay, clay	CH, CL, MH, ML	A-6, A-7	0	0	80-100	65-100	60-100	55-95	35-55	11-25
	65-75	Weathered bedrock			---	---	---	---	---	---	---	---
GxF:												
Gilpin----------	0-10	Very stony silt loam	CL, CL-ML, GC, SC	A-2, A-4, A-6	---	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	CL, CL-ML, GC-GM, SC	A-2, A-4, A-5	---	0-30	50-95	45-90	35-85	30-80	20-41	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC, GC-GM	A-1, A-2, A-4, A-5	---	0-35	25-55	20-50	15-45	15-40	20-41	4-15
	37-47	Unweathered bedrock			---	---	---	---	---	---	---	---
Upshur----------	0-11	Very stony silt loam	CL, CL-ML, ML	A-4, A-6	---	3-10	95-100	95-100	85-100	65-90	25-40	5-15
	11-42	Silty clay, clay	CH, CL, MH	A-7	0	0	95-100	95-100	90-100	85-100	45-70	20-40
	42-65	Channery silty clay loam, silty clay, clay	ML, CH, CL, MH	A-6, A-7	0	0	80-100	65-100	60-100	55-95	35-55	11-25
	65-75	Weathered bedrock			---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
GyC:												
Gilpin----------	0-10	Silt loam	CL-ML, CL	A-4, A-6	---	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	CL, SC, GC, CL-ML	A-2, A-4, A-6	---	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC-GM, GC	A-1, A-2, A-4, A-6	---	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	37-40	Unweathered bedrock			---	---	---	---	---	---	---	---
Lily------------	0-4	Loam	ML, CL-ML	A-4	---	0-5	90-100	85-100	70-95	55-80	0-35	NP-10
	4-28	Loam, clay loam, sandy clay loam	SC, SM, CL, ML	A-4, A-6	---	0-5	90-100	85-100	75-100	40-80	0-35	3-15
	28-32	Channery sandy loam, channery clay loam, channery loam	SM, SC, ML, CL	A-1-b, A-2, A-4, A-6	---	0-10	65-100	50-100	40-95	20-75	0-35	3-15
	32-42	Unweathered bedrock			---	---	---	---	---	---	---	---
GyD:												
Gilpin----------	0-10	Silt loam	CL-ML, CL	A-4, A-6	---	0-5	75-100	75-100	70-85	65-80	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	SC, GC, CL-ML, CL	A-2, A-4, A-6	---	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC, GC-GM	A-1, A-2, A-4, A-6	---	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	37-47	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
GyD:												
Lily------------	0-4	Loam	ML, CL-ML	A-4	---	0-5	90-100	85-100	70-95	55-80	0-35	NP-10
	4-28	Clay loam, sandy clay loam, loam	SM, SC, ML, CL	A-4, A-6	---	0-5	90-100	85-100	75-100	40-80	0-35	3-15
	28-32	Channery sandy loam, channery clay loam, channery loam	ML, SM, CL, SC	A-1-b, A-2, A-4, A-6	---	0-10	65-100	50-100	40-95	20-75	0-35	3-15
	32-42	Unweathered bedrock			---	---	---	---	---	---	---	---
GyE:												
Gilpin----------	0-10	Silt loam	CL, CL-ML	A-4, A-6	---	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	CL, CL-ML, GC, SC	A-2, A-4, A-6	---	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC, GC-GM	A-1, A-2, A-4, A-6	---	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	37-47	Unweathered bedrock			---	---	---	---	---	---	---	---
Lily------------	0-4	Loam	CL-ML, ML	A-4	---	0-5	90-100	85-100	70-95	55-80	0-35	NP-10
	4-28	Loam, sandy clay loam, clay loam	CL, ML, SC, SM	A-4, A-6	---	0-5	90-100	85-100	75-100	40-80	0-35	3-15
	28-32	Channery sandy loam, channery clay loam, channery loam	CL, ML, SC, SM	A-1-b, A-2, A-4, A-6	---	0-10	65-100	50-100	40-95	20-75	0-35	3-15
	32-42	Unweathered bedrock			---	---	---	---	---	---	---	---
ItF:												
Itmann----------	0-12	Channery clay loam	CL, ML	A-6	---	0-10	55-80	50-75	45-75	35-70	30-40	10-18
	12-65	Very channery sandy loam, extremely channery sandy loam	GC-GM, GM	A-1, A-2	---	0-15	30-55	25-50	20-45	10-35	15-25	NP-7

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
LaE:												
Laidig----------	0-11	Extremely stony loam	CL-ML, GC-GM, SC-SM, SM	A-4	5-20	15-30	65-90	50-80	45-80	35-70	15-30	NP-10
	11-42	Channery loam, channery sandy loam, channery silt loam	CL, ML, SC, SM	A-2, A-4, A-6	0-5	5-20	70-95	50-90	40-80	20-70	15-40	2-18
	42-65	Channery loam, channery sandy loam, very channery loam	CL-ML, GC, GC-GM, SC	A-2, A-4, A-6	0-5	5-20	50-90	40-85	30-80	15-70	15-35	2-16
PGF:												
Pineville-------	0-10	Very stony loam	CL-ML, ML, SC-SM, SM	A-2, A-4	---	3-15	55-90	50-85	45-80	30-75	25-35	4-10
	10-54	Channery loam, very channery loam, channery clay loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	---	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	54-65	Very channery loam, channery loam, very channery sandy loam	SC-SM, SC, GM, GC-GM	A-1, A-2, A-4, A-6	---	5-20	35-75	30-70	25-65	20-60	25-35	4-12
Gilpin----------	0-10	Very stony loam	CL, SC, GC, CL-ML	A-2, A-4, A-6	---	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	10-29	Silt loam, channery silty clay loam, channery silt loam	GC-GM, CL, SC, CL-ML	A-2, A-4, A-5	---	0-30	50-95	45-90	35-85	30-80	20-41	4-15
	29-37	Channery silty clay loam, channery silt loam, channery loam	GC, GC-GM	A-1, A-2, A-4, A-5	---	0-35	25-55	20-50	15-45	15-40	20-41	4-15
	37-47	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
PGF:												
Laidig----------	0-11	Extremely stony loam	GC-GM, SM, SC-SM, CL-ML	A-4	5-20	15-30	65-90	50-80	45-80	35-70	15-30	NP-10
	11-42	Channery loam, channery sandy loam, channery silt loam	SM, SC, ML, CL	A-2, A-4, A-6	0-5	5-20	70-95	50-90	40-80	20-70	15-40	2-18
	42-65	Channery loam, channery sandy loam, very channery loam	SC, GC, CL-ML, GC-GM	A-2, A-4, A-6	0-5	5-20	50-90	40-85	30-80	15-70	15-35	2-16
Po:												
Pope------------	0-10	Sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0	85-100	75-100	51-85	25-55	0-20	NP-5
	10-36	Sandy loam, loam, fine sandy loam	CL-ML, ML, SC-SM, SM	A-2, A-4	0	0	95-100	80-100	51-95	25-75	0-30	NP-7
	36-65	Sandy loam, loamy sand, gravelly sandy loam	GM, ML, SC-SM, SM	A-1, A-2, A-4	---	0-20	45-100	35-100	30-95	15-70	0-30	NP-7
Px:												
Pope------------	0-10	Sandy loam	ML, SC-SM, CL-ML, SM	A-2, A-4	0	0	85-100	75-100	51-85	25-55	0-20	NP-5
	10-36	Sandy loam, loam, fine sandy loam	CL-ML, SM, SC-SM, ML	A-2, A-4	0	0	95-100	80-100	51-95	25-75	0-30	NP-7
	36-65	Sandy loam, loamy sand, gravelly sandy loam	ML, GM, SC-SM, SM	A-1, A-2, A-4	---	0-20	45-100	35-100	30-95	15-70	0-30	NP-7

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
Px:												
Craigsville-----	0-8	Gravelly sandy loam	SM, CL-ML, SC, ML	A-2, A-4	---	0-25	65-90	60-85	40-75	25-60	0-25	NP-10
	8-37	Extremely gravelly sandy loam, very gravelly sandy loam, very gravelly loam	GC, SM, SC, GM	A-1, A-2, A-4	---	25-60	50-80	30-65	25-60	15-40	0-25	NP-10
	37-65	Extremely gravelly loamy sand, very gravelly loamy sand, very gravelly sandy loam	GM, GC-GM, GC, GP-GM	A-1, A-2	---	35-75	35-55	30-50	20-45	10-25	0-25	NP-8
Ss:												
Sensabaugh------	0-9	Silt loam	CL, CL-ML, ML	A-4	---	0-5	90-100	75-95	65-85	55-75	16-29	3-9
	9-20	Gravelly loam, gravelly silt loam, gravelly clay loam	CL, CL-ML, GC, SC-SM	A-4, A-6	---	2-18	70-95	55-90	45-75	35-65	20-35	5-14
	20-33	Very gravelly loam, gravelly clay loam, very gravelly silt loam	GC, GC-GM, SC, SC-SM	A-4, A-6	---	5-25	70-90	55-75	45-65	35-55	22-36	6-15
	33-65	Gravelly loam, gravelly clay loam, gravelly fine sandy loam	GC, GC-GM, SC, SC-SM	A-2, A-4, A-6	---	5-30	55-90	25-75	25-65	20-55	20-36	6-15
Ud:												
Udorthents------	0-3	---	---	---	---	---	---	---	---	---	---	---
	3-65	---	---	---	---	---	---	---	---	---	---	---

Table 15.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
VaD:												
Vandalia--------	0-8	Silt loam	CL, ML	A-4, A-6, A-7	---	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	8-44	Silty clay loam, channery silty clay, silty clay	CH, CL, ML	A-6, A-7	---	0-5	75-100	70-95	65-90	60-85	35-55	15-30
	44-65	Channery silty clay, silty clay, channery silty clay loam	CH, CL, MH, ML	A-6, A-7	---	0-5	70-100	65-100	60-100	55-100	30-55	10-30
VaE:												
Vandalia--------	0-8	Silt loam	CL, ML	A-4, A-6, A-7	---	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	8-44	Silty clay loam, channery silty clay, silty clay	CH, CL, ML	A-6, A-7	---	0-5	75-100	70-95	65-90	60-85	35-55	15-30
	44-65	Channery silty clay, silty clay, channery silty clay loam	CH, CL, MH, ML	A-6, A-7	---	0-5	70-100	65-100	60-100	55-100	30-55	10-30

Table 16.--Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (K_{sat})	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	Pct	g/cc	in/hr	In/in	Pct	Pct				meq/100g	meq/100g	pH
AgB:													
Allegheny-------	0-9	15-27	1.20-1.40	0.57-1.98	0.12-0.22	0.0-2.9	1.0-4.0	.32	.32	4	---	---	3.6-5.5
	9-49	18-35	1.20-1.50	0.57-1.98	0.13-0.18	0.0-2.9	---	.28	.28		---	---	3.6-5.5
	49-65	10-35	1.20-1.40	0.57-1.98	0.08-0.17	0.0-2.9	---	.28	.28		---	---	3.6-5.5
CeF:													
Cedarcreek------	0-10	18-27	1.35-1.65	0.60-6.00	0.07-0.16	0.0-2.9	0.0-0.5	.32	.43	5	---	---	3.6-5.5
	10-65	18-27	1.35-1.65	0.60-6.00	0.07-0.16	0.0-2.9	---	.32	.43		---	---	3.6-5.5
Ch:													
Chavies---------	0-9	7-18	1.20-1.40	2.00-6.00	0.11-0.18	0.0-2.9	0.5-4.0	.24	.24	5	---	---	4.5-7.3
	9-57	7-18	1.20-1.40	2.00-6.00	0.11-0.20	0.0-2.9	---	.24	.24		---	---	4.5-7.3
	57-65	7-18	1.30-1.50	2.00-6.00	0.08-0.18	0.0-2.9	---	.24	.24		---	---	4.5-6.0
FpF:													
Fairpoint-------	0-4	18-27	1.40-1.55	0.60-2.00	0.09-0.16	0.0-2.9	0.0-0.5	.28	.49	5	7.0-15	---	5.6-7.3
	4-65	18-35	1.60-1.80	0.20-0.60	0.03-0.10	3.0-5.9	0.0-0.3	.28	.64		7.0-20	---	5.6-7.3
GaF:													
Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.08-0.14	0.0-2.9	---	.24	.32	3	---	---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-47	---	---	0.20-2.00	---	---	---	---	---		---	---	---
GuC:													
Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.12-0.18	0.0-2.9	0.5-4.0	.32	.32	3	---	---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-47	---	---	0.20-2.00	---	---	---	---	---		---	---	---
Upshur----------	0-11	15-27	1.20-1.40	0.60-2.00	0.12-0.16	3.0-5.9	1.0-4.0	.43	.43	4	---	---	4.5-6.5
	11-42	40-55	1.30-1.60	0.06-0.20	0.10-0.14	6.0-8.9	---	.32	.32		---	---	4.5-8.4
	42-65	27-45	1.30-1.60	0.06-0.20	0.08-0.12	3.0-5.9	---	.32	.32		---	---	5.1-8.4
	65-75	---	---	0.00-0.20	---	---	---	---	---		---	---	---
GuD:													
Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.12-0.18	0.0-2.9	0.5-4.0	.32	.32	3	---	---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-47	---	---	0.20-2.00	---	---	---	---	---		---	---	---
Upshur----------	0-11	15-27	1.20-1.40	0.60-2.00	0.12-0.16	3.0-5.9	1.0-4.0	.43	.43	4	---	---	4.5-6.5
	11-42	40-55	1.30-1.60	0.06-0.20	0.10-0.14	6.0-8.9	---	.32	.32		---	---	4.5-8.4
	42-65	27-45	1.30-1.60	0.06-0.20	0.08-0.12	3.0-5.9	---	.32	.32		---	---	5.1-8.4
	65-75	---	---	0.00-0.20	---	---	---	---	---		---	---	---

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (K_{sat})	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	Pct	g/cc	in/hr	In/in	Pct	Pct				meq/100g	meq/100g	pH
GuE:													
Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.12-0.18	0.0-2.9	0.5-4.0	.32	.32	3	---	---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-47	---	---	0.20-2.00	---	---	---	---	---		---	---	---
Upshur----------	0-11	15-27	1.20-1.40	0.60-2.00	0.12-0.16	3.0-5.9	1.0-4.0	.43	.43	4	---	---	4.5-6.5
	11-42	40-55	1.30-1.60	0.06-0.20	0.10-0.14	6.0-8.9	---	.32	.32		---	---	4.5-8.4
	42-65	27-45	1.30-1.60	0.06-0.20	0.08-0.12	3.0-5.9	---	.32	.32		---	---	5.1-8.4
	65-75	---	---	0.00-0.20	---	---	---	---	---		---	---	---
GxF:													
Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.08-0.14	0.0-2.9	---	.24	.32	3	---	---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-47	---	---	0.20-2.00	---	---	---	---	---		---	---	---
Upshur----------	0-11	15-27	1.20-1.40	0.60-2.00	0.12-0.16	3.0-5.9	---	.37	.43	4	---	---	4.5-6.5
	11-42	40-55	1.30-1.60	0.06-0.20	0.10-0.14	6.0-8.9	---	.32	.32		---	---	4.5-8.4
	42-65	27-45	1.30-1.60	0.06-0.20	0.08-0.12	3.0-5.9	---	.32	.32		---	---	5.1-8.4
	65-75	---	---	0.00-0.20	---	---	---	---	---		---	---	---
GyC:													
Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.12-0.18	0.0-2.9	0.5-4.0	.32	.32	3	---	---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-40	---	---	0.20-2.00	---	---	---	---	---		---	---	---

Lily------------	0-4	7-27	1.20-1.40	0.60-6.00	0.13-0.18	0.0-2.9	0.5-4.0	.28	.37	2	---	10-45	3.6-5.5
	4-28	18-35	1.25-1.35	2.00-6.00	0.12-0.18	0.0-2.9	0.1-0.5	.28	.28		---	5.0-50	3.6-5.5
	28-32	16-34	1.25-1.35	2.00-6.00	0.08-0.17	0.0-2.9	0.1-0.5	.17	.24		---	5.0-50	3.6-5.5
	32-42	---	---	0.00-0.20	---	---	---	---	---		---	---	---
GyD:													
Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.12-0.18	0.0-2.9	0.5-4.0	.32	.32	3	---	---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-47	---	---	0.20-2.00	---	---	---	---	---		---	---	---
Lily------------	0-4	7-27	1.20-1.40	0.60-6.00	0.13-0.18	0.0-2.9	0.5-4.0	.28	.37	2	---	10-45	3.6-5.5
	4-28	18-35	1.25-1.35	2.00-6.00	0.12-0.18	0.0-2.9	0.1-0.5	.28	.28		---	5.0-50	3.6-5.5
	28-32	16-34	1.25-1.35	2.00-6.00	0.08-0.17	0.0-2.9	0.1-0.5	.17	.24		---	5.0-50	3.6-5.5
	32-42	---	---	0.00-0.20	---	---	---	---	---		---	---	---

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	Pct	g/cc	in/hr	In/in	Pct	Pct				meq/100g	meq/100g	pH
GyE:													
Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.12-0.18	0.0-2.9	0.5-4.0	.32	.32	3	---	---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-47	---	---	0.20-2.00	---	---	---	---	---		---	---	---

Lily------------	0-4	7-27	1.20-1.40	0.60-6.00	0.13-0.18	0.0-2.9	0.5-4.0	.28	.37	2	---	10-45	3.6-5.5
	4-28	18-35	1.25-1.35	2.00-6.00	0.12-0.18	0.0-2.9	0.1-0.5	.28	.28		---	5.0-50	3.6-5.5
	28-32	16-34	1.25-1.35	2.00-6.00	0.08-0.17	0.0-2.9	0.1-0.5	.17	.24		---	5.0-50	3.6-5.5
	32-42	---	---	0.00-0.20	---	---	---	---	---		---	---	---
ItF:													
Itmann----------	0-12	27-40	1.30-1.55	0.60-6.00	0.08-0.16	3.0-5.9	0.0-0.5	.37	.37	5	---	---	5.6-7.3
	12-65	4-15	1.00-1.30	2.00-20.00	0.05-0.12	0.0-2.9	0.0-0.5	.32	.43		---	---	3.6-5.5
LaE:													
Laidig----------	0-11	7-27	1.20-1.40	0.60-6.00	0.08-0.12	0.0-2.9	2.0-4.0	.24	.32	4		8.0-20	3.6-5.5
	11-42	18-35	1.30-1.50	0.60-6.00	0.08-0.12	0.0-2.9	0.0-0.5	.24	.28		---	7.0-15	3.6-5.5
	42-65	18-35	1.40-1.70	0.06-0.60	0.06-0.10	0.0-2.9	0.0-0.5	.17	.20		---	5.0-15	3.6-5.5

PGF:													
Pineville-------	0-10	15-25	1.00-1.30	0.60-2.00	0.12-0.18	0.0-2.9	0.5-5.0	.20	.24	5	---	---	3.6-7.3
	10-54	18-30	1.30-1.60	0.60-2.00	0.08-0.14	0.0-2.9	---	.15	.17		---	---	3.6-5.5
	54-65	15-30	1.30-1.60	0.60-6.00	0.06-0.14	0.0-2.9	---	.15	.20		---	---	3.6-5.5

Gilpin----------	0-10	15-27	1.20-1.40	0.60-2.00	0.08-0.14	0.0-2.9	---	.24	.32	3		---	3.6-5.5
	10-29	18-35	1.20-1.50	0.60-2.00	0.12-0.16	0.0-2.9	---	.24	.28		---	---	3.6-5.5
	29-37	15-35	1.20-1.50	0.60-2.00	0.08-0.12	0.0-2.9	---	.24	.32		---	---	3.6-5.5
	37-47	---	---	0.20-2.00	---	---	---	---	---		---	---	---
Laidig----------	0-11	7-27	1.20-1.40	0.60-6.00	0.08-0.12	0.0-2.9	2.0-4.0	.24	.32	4	---	8.0-20	3.6-5.5
	11-42	18-35	1.30-1.50	0.60-6.00	0.08-0.12	0.0-2.9	0.0-0.5	.24	.28		---	7.0-15	3.6-5.5
	42-65	18-35	1.40-1.70	0.06-0.60	0.06-0.10	0.0-2.9	0.0-0.5	.17	.20		---	5.0-15	3.6-5.5
Po:													
Pope------------	0-10	5-15	1.20-1.40	2.00-6.00	0.10-0.16	0.0-2.9	1.0-4.0	.28	.28	5	---	---	3.6-5.5
	10-36	5-18	1.30-1.60	0.60-6.00	0.10-0.18	0.0-2.9	---	.28	.28		---	---	3.6-5.5
	36-65	5-20	1.30-1.60	0.60-6.00	0.10-0.18	0.0-2.9	---	.28	.20		---	---	3.6-5.5
Px:													
Pope------------	0-10	5-15	1.20-1.40	2.00-6.00	0.10-0.16	0.0-2.9	1.0-4.0	.28	.28	5	---	---	3.6-5.5
	10-36	5-18	1.30-1.60	0.60-6.00	0.10-0.18	0.0-2.9	---	.28	.28		---	---	3.6-5.5
	36-65	5-20	1.30-1.60	0.60-6.00	0.10-0.18	0.0-2.9	---	.28	.20		---	---	3.6-5.5
Craigsville-----	0-8	5-15	1.20-1.40	2.00-20.00	0.07-0.15	0.0-2.9	1.0-5.0	.17	.28	3	---	---	4.5-5.5
	8-37	5-15	1.30-1.60	2.00-20.00	0.06-0.15	0.0-2.9	0.5-1.0	.17	.28		---	---	4.5-5.5
	37-65	5-10	1.35-1.55	6.00-20.00	0.04-0.09	0.0-2.9	0.5-1.0	.17	.28		---	---	4.5-5.5

Table 16.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
								K	Kf	T			
	In	Pct	g/cc	in/hr	In/in	Pct	Pct				meq/100g	meq/100g	pH
Ss:													
Sensabaugh------	0-9	8-25	1.25-1.40	0.60-6.00	0.12-0.18	0.0-2.9	1.0-3.0	.24	.24	5	---	---	5.6-7.8
	9-20	18-35	1.30-1.50	0.60-6.00	0.10-0.16	0.0-2.9	---	.20	.24		---	---	5.6-7.8
	20-33	12-35	1.30-1.50	0.60-6.00	0.10-0.15	0.0-2.9	---	.17	.24		---	---	5.6-7.8
	33-65	12-38	1.25-1.50	0.60-6.00	0.08-0.14	0.0-2.9	---	.17	.20		---	---	5.6-7.8
Ud:													
Udorthents------	0-3	---	---	---	---	---	---	---	---	---	---	---	---
	3-65	---	---	---	---	---	---	---	---		---	---	---
VaD:													
Vandalia--------	0-8	20-35	1.20-1.50	0.20-2.00	0.12-0.18	3.0-5.9	1.0-3.0	.37	.37	5	---	---	4.5-6.0
	8-44	35-50	1.30-1.60	0.06-0.60	0.12-0.15	6.0-8.9	---	.32	.32		---	---	4.5-6.0
	44-65	27-50	1.30-1.60	0.06-0.60	0.08-0.12	6.0-8.9	---	.32	.32		---	---	5.1-7.3
VaE:													
Vandalia--------	0-8	20-35	1.20-1.50	0.20-2.00	0.12-0.18	3.0-5.9	1.0-3.0	.37	.37	5	---	---	4.5-6.0
	8-44	35-50	1.30-1.60	0.06-0.60	0.12-0.15	6.0-8.9	---	.32	.32		---	---	4.5-6.0
	44-65	27-50	1.30-1.60	0.06-0.60	0.08-0.12	6.0-8.9	---	.32	.32		---	---	5.1-7.3

Table 17.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
AgB:						
Allegheny	---	---	---	Moderate	Low	High
CeF:						
Cedarcreek	---	---	---	Moderate	Moderate	High
Ch:						
Chavies	---	---	---	Low	Low	Moderate
FpF:						
Fairpoint	---	---	---	Moderate	High	Moderate
GaF:						
Gilpin	Bedrock (paralithic)	20-40	Moderately cemented	Moderate	Low	High
GuC:						
Gilpin	Bedrock (paralithic)	20-40	Moderately cemented	Moderate	Low	High
Upshur	Bedrock (paralithic)	40-70	Weakly cemented	Moderate	High	Moderate
GuD:						
Gilpin	Bedrock (paralithic)	20-40	Moderately cemented	Moderate	Low	High
Upshur	Bedrock (paralithic)	40-70	Weakly cemented	Moderate	High	Moderate
GuE:						
Gilpin	Bedrock (paralithic)	20-40	Moderately cemented	Moderate	Low	High
Upshur	Bedrock (paralithic)	40-70	Weakly cemented	Moderate	High	Moderate
GxF:						
Gilpin	Bedrock (paralithic)	20-40	Moderately cemented	Moderate	Low	High
Upshur	Bedrock (paralithic)	40-40	Weakly cemented	Moderate	High	Moderate
GyC:						
Gilpin	Bedrock (paralithic)	20-40	Strongly cemented	Moderate	Low	High
Lily	Bedrock (lithic)	20-40	Indurated	None	Moderate	High
GyD:						
Gilpin	Bedrock (paralithic)	20-40	Strongly cemented	Moderate	Low	High
Lily	Bedrock (lithic)	20-40	Indurated	None	Moderate	High
GyE:						
Gilpin	Bedrock (paralithic)	20-40	Strongly cemented	Moderate	Low	High
Lily	Bedrock (lithic)	20-40	Indurated	None	Moderate	High

Table 17.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
ItF:						
Itmann	---	---	---	Moderate	High	High
LaE:						
Laidig	Fragipan	---	Noncemented	Moderate	Moderate	High
PGF:						
Pineville	---	---	---	Moderate	Low	High
Gilpin	Bedrock (paralithic)	20-40	Strongly cemented	Moderate	Low	High
Laidig	Fragipan	30-49	Noncemented	Moderate	Moderate	High
Po:						
Pope	---	---	---	Moderate	Low	High
Px:						
Pope	---	---	---	Moderate	Low	High
Craigsville	---	---	---	Moderate	Low	Moderate
Ss:						
Sensabaugh	---	---	---	None	Low	Low
Ud:						
Udorthents	---	---	---	---	---	---
VaD:						
Vandalia	---	---	---	Moderate	High	Moderate
VaE:						
Vandalia	---	---	---	Moderate	High	Moderate

Table 18.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
				Ft	Ft		
AgB:							
Allegheny	B	Low	Jan-Dec	---	---	---	---
CeF:							
Cedarcreek	C	Medium	Jan-Dec	---	---	---	---
Ch:							
Chavies	B	Very low	January	---	---	Very brief	Rare
			February	---	---	Very brief	Rare
			March	---	---	Very brief	Rare
			April	---	---	Very brief	Rare
			May	---	---	Very brief	Rare
			June	---	---	Very brief	Rare
			July	---	---	Very brief	Rare
			August	---	---	Very brief	Rare
			September	---	---	Very brief	Rare
			October	---	---	Very brief	Rare
			November	---	---	Very brief	Rare
			December	---	---	Very brief	Rare
FpF:							
Fairpoint	C	Very high	Jan-Dec	---	---	---	---
GaF:							
Gilpin	C	High	Jan-Dec	---	---	---	---
GuC:							
Gilpin	C	Medium	Jan-Dec	---	---	---	---
Upshur	D	Very high	Jan-Dec	---	---	---	---
GuD:							
Gilpin	C	High	Jan-Dec	---	---	---	---
Upshur	D	Very high	Jan-Dec	---	---	---	---
GuE:							
Gilpin	C	High	Jan-Dec	---	---	---	---
Upshur	D	Very high	Jan-Dec	---	---	---	---
GxF:							
Gilpin	C	High	Jan-Dec	---	---	---	---
Upshur	D	Very high	Jan-Dec	---	---	---	---
GyC:							
Gilpin	C	Medium	Jan-Dec	---	---	---	---
Lily	B	High	Jan-Dec	---	---	---	---
GyD:							
Gilpin	C	High	Jan-Dec	---	---	---	---
Lily	B	High	Jan-Dec	---	---	---	---
GyE:							
Gilpin	C	High	Jan-Dec	---	---	---	---

Table 18.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
				Ft	Ft		
GyE:							
Lily	B	High	Jan-Dec	---	---	---	---
ItF:							
Itmann	C	Medium	Jan-Dec	---	---	---	---
LaE:							
Laidig	C	Medium	January	2.0-4.1	3.8-6.7	---	None
			February	2.0-4.1	3.8-6.7	---	None
			March	2.0-4.1	3.8-6.7	---	None
PGF:							
Pineville	B	High	Jan-Dec	---	---	---	---
Gilpin	C	High	Jan-Dec	---	---	---	---
Laidig	C	Medium	January	2.0-4.1	3.8-6.7	---	None
			February	2.0-4.1	3.8-6.7	---	None
			March	2.0-4.1	3.8-6.7	---	None
Po:							
Pope	B	Very low	January	---	---	Brief	Occasional
			February	---	---	Brief	Occasional
			March	---	---	Brief	Occasional
			April	---	---	Brief	Occasional
			November	---	---	Brief	Occasional
			December	---	---	Brief	Occasional
Px:							
Pope	B	Very low	January	---	---	Brief	Occasional
			February	---	---	Brief	Occasional
			March	---	---	Brief	Occasional
			April	---	---	Brief	Occasional
			November	---	---	Brief	Occasional
			December	---	---	Brief	Occasional
Craigsville	B	Negligible	January	---	---	Very brief	Occasional
			February	---	---	Very brief	Occasional
			March	---	---	Very brief	Occasional
			April	---	---	Very brief	Occasional
			May	---	---	Very brief	Occasional
			November	---	---	Very brief	Occasional
			December	---	---	Very brief	Occasional
Ss:							
Sensabaugh	B	Very low	January	4.0-6.0	>6.0	Very brief	Occasional
			February	4.0-6.0	>6.0	Very brief	Occasional
			March	4.0-6.0	>6.0	Very brief	Occasional
			April	4.0-6.0	>6.0	Very brief	Occasional
Ud:							
Udorthents	---	---	Jan-Dec	---	---	---	---
VaD:							
Vandalia	D	Very high	February	2.7-3.5	4.0-6.0	---	None
			March	2.7-3.5	4.0-6.0	---	None
			April	2.7-3.5	4.0-6.0	---	None
VaE:							
Vandalia	D	Very high	February	2.7-3.5	4.0-6.0	---	None
			March	2.7-3.5	4.0-6.0	---	None
			April	2.7-3.5	4.0-6.0	---	None

Table 19.--Classification of the Soils

Soil name	Family or higher taxonomic class
Allegheny	Fine-loamy, mixed, semiactive, mesic Typic Hapludults
Cedarcreek	Loamy-skeletal, mixed, active, acid, mesic Typic Udorthents
Chavies	Coarse-loamy, mixed, active, mesic Ultic Hapludalfs
Craigsville	Loamy-skeletal, mixed, superactive, mesic Fluventic Dystrochrepts
Fairpoint	Loamy-skeletal, mixed, active, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, active, mesic Typic Hapludults
Itmann	Loamy-skeletal, mixed, semiactive, acid, mesic Typic Udorthents
Laidig	Fine-loamy, siliceous, active, mesic Typic Fragiudults
Lily	Fine-loamy, siliceous, semiactive, mesic Typic Hapludults
Pineville	Fine-loamy, mixed, active, mesic Typic Hapludults
Pope	Coarse-loamy, mixed, active, mesic Fluventic Dystrochrepts
Sensabaugh	Fine-loamy, mixed, semiactive, mesic Dystric Fluventic Eutrochrepts
Udorthents	Udorthents
Upshur	Fine, mixed, superactive, mesic Typic Hapludalfs
Vandalia	Fine, mixed, active, mesic Typic Hapludalfs

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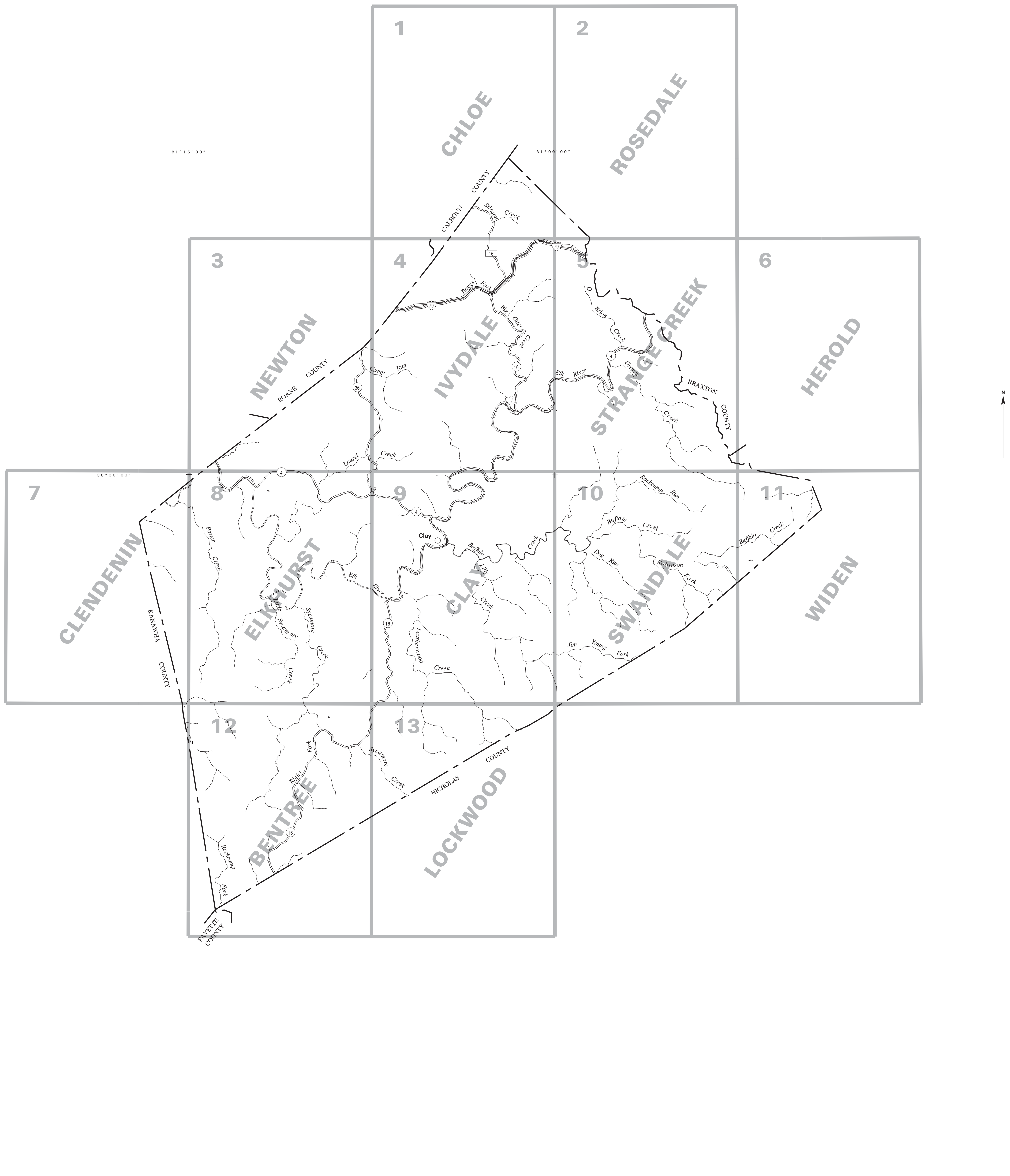


INDEX TO MAP SHEETS
CLAY COUNTY,
WEST VIRGINIA

MILES

KILOMETERS

SCALE = 1:135000

SOIL LEGEND

SYMBOL	NAME
AgB	Allegheny loam, 3 to 8 percent slopes
CeF	Cedarcreek very channery loam, very steep, very stony
Ch	Chavies fine sandy loam
FpF	Fairpoint channery loam, very steep, very stony
GaF	Gilpin silt loam, 35 to 70 percent slopes, very stony
GuC	Gilpin-Upshur complex, 8 to 15 percent slopes
GuD	Gilpin-Upshur complex, 15 to 25 percent slopes
GuE	Gilpin-Upshur complex, 25 to 35 percent slopes
GxF	Gilpin-Upshur complex, 35 to 70 percent slopes, very stony
GyC	Gilpin and Lily soils, 8 to 15 percent slopes
GyD	Gilpin and Lily soils, 15 to 25 percent slopes
GyE	Gilpin and Lily soils, 25 to 35 percent slopes
ItF	Itmann channery clay loam, very steep
LaE	Laidig channery loam, 15 to 35 percent slopes, extremely stony
PGF	Pineville-Gilpin-Laidig association, very steep, extremely stony
Po	Pope sandy loam
Px	Pope-Craigsville complex
Ss	Sensabaugh silt loam
Ud	Udorthents, smoothed
VaD	Vandalia silt loam, 15 to 25 percent slopes
VaE	Vandalia silt loam, 25 to 35 percent slopes
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline & neatline
- Previously Published Survey

OTHER BOUNDARY (label)

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate 173 79 345
- Federal 287 410 224
- State 52 52 347
- County, farm or ranch 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad
- Single side slope (showing actual feature location)

DAMS

- Medium or Small

LANDFORM FEATURES

- Prominent hill or peak
- Soil Sample Site

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Other Religion (label) — Mt Carmel
- Located object (label) — Ranger Station
- Tank (label) — Petroleum
- Lookout Tower
- Oil and/or Natural Gas Wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

DRAINAGE AND IRRIGATION

- Double-line canal (label) — CANAL
- Perennial drainage and/or irrigation ditch
- Intermittent drainage and/ or irrigation ditch

SMALL LAKES, PONDS AND RESERVOIRS

- Perennial water
- Miscellaneous water
- Flood pool line — FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — AgB GyC

LANDFORM FEATURES

ESCARPMENTS

- Bedrock
- Other than bedrock

SHORT STEEP SLOPE

GULLY

DEPRESSION, closed

SINKHOLE

EXCAVATIONS

PITS

- Borrow pits
- Gravel pit
- Mine or quarry

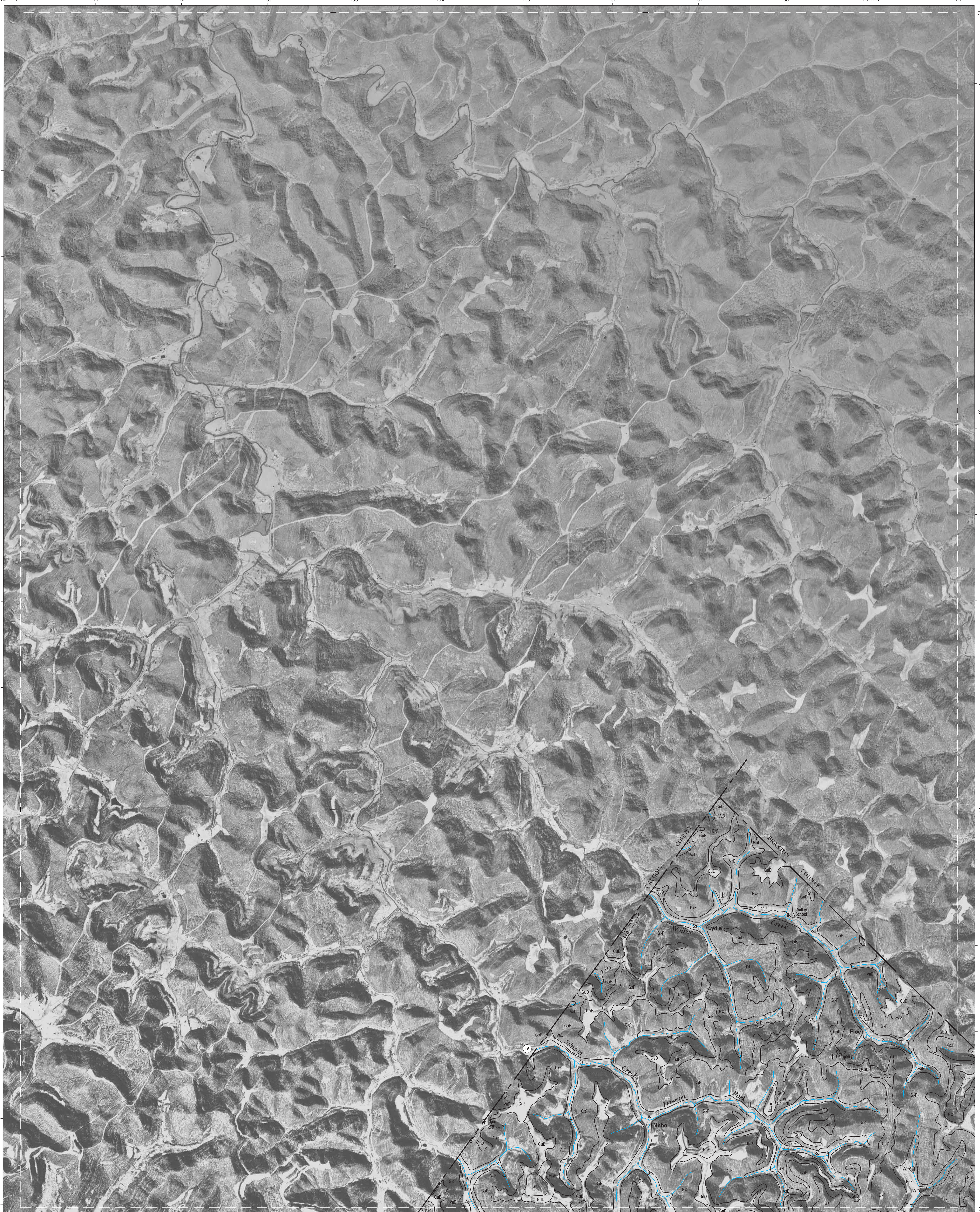
LANDFILL

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava flow
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
CHLOE QUADRANGLE
SHEET NUMBER 1 OF 13



Joins sheet 2, Rosedale

Joins sheet 3, Newton

Joins sheet 4, Ivydale

Joins sheet 5, Strange Creek

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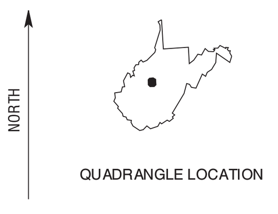
North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

		2
3	4	5

2 ROSEDALE
3 NEWTON
4 IVYDALE
5 STRANGE CREEK

INDEX TO ADJOINING 7.5 MAPS

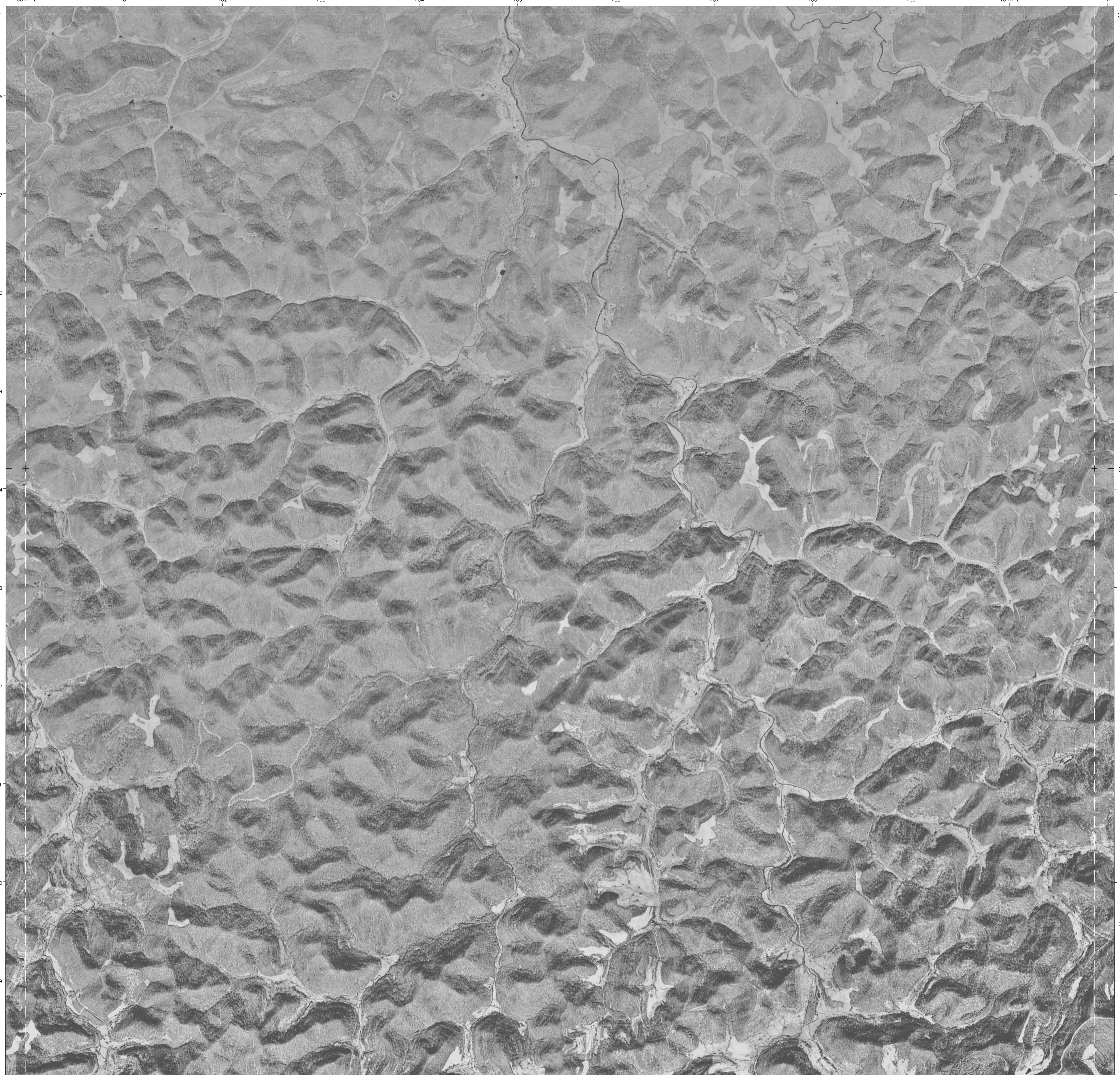
CHLOE, WEST VIRGINIA

7.5 MINUTE SERIES
SHEET NUMBER 1 OF 13

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
ROSEDALE QUADRANGLE
SHEET NUMBER 2 OF 13



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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	■	
4	5	6

1 CHLOE
4 IVYDALE
5 STRANGE CREEK
6 HEROLD

INDEX TO ADJOINING 7.5 MAPS

ROSEDALE, WEST VIRGINIA
7.5 MINUTE SERIES
SHEET NUMBER 2 OF 13

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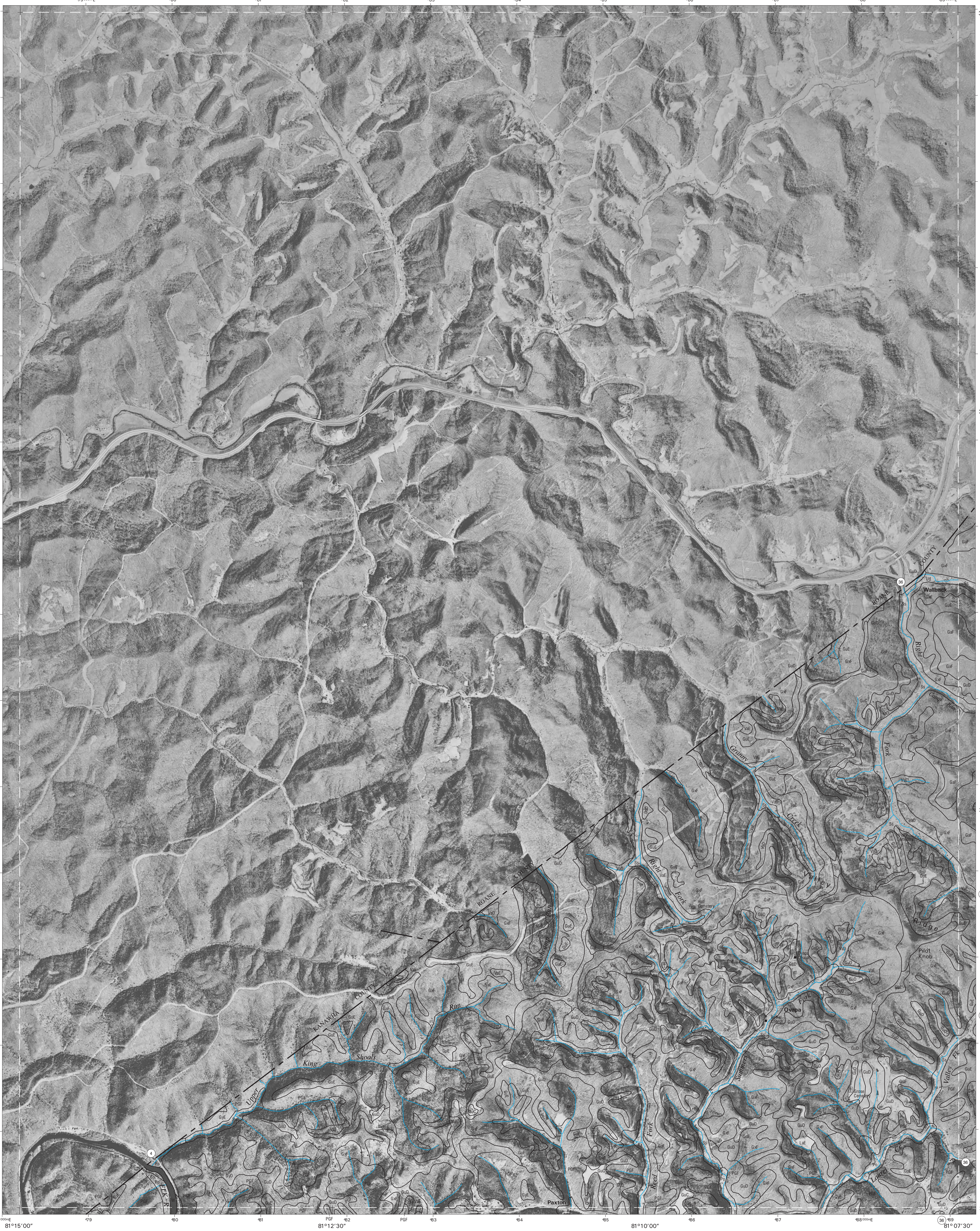
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
NEWTON QUADRANGLE
SHEET NUMBER 3 OF 13



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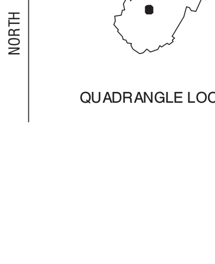
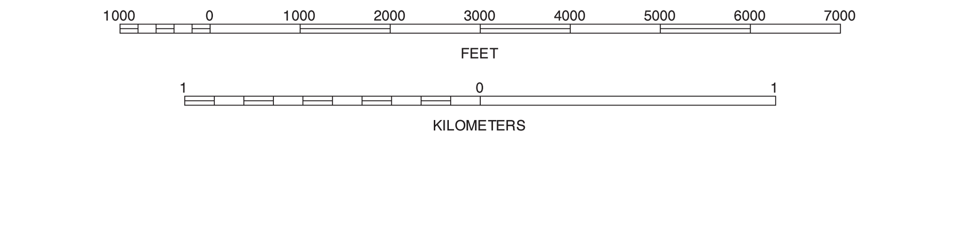


QUADRANGLE LOCATION

SCALE 1:24000



		1
	■	4
7	8	9

1 CHLOE
4 IVYDALE
7 CLENDENIN
8 ELKHURST
9 CLAY

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NEWTON, WEST VIRGINIA
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 13

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

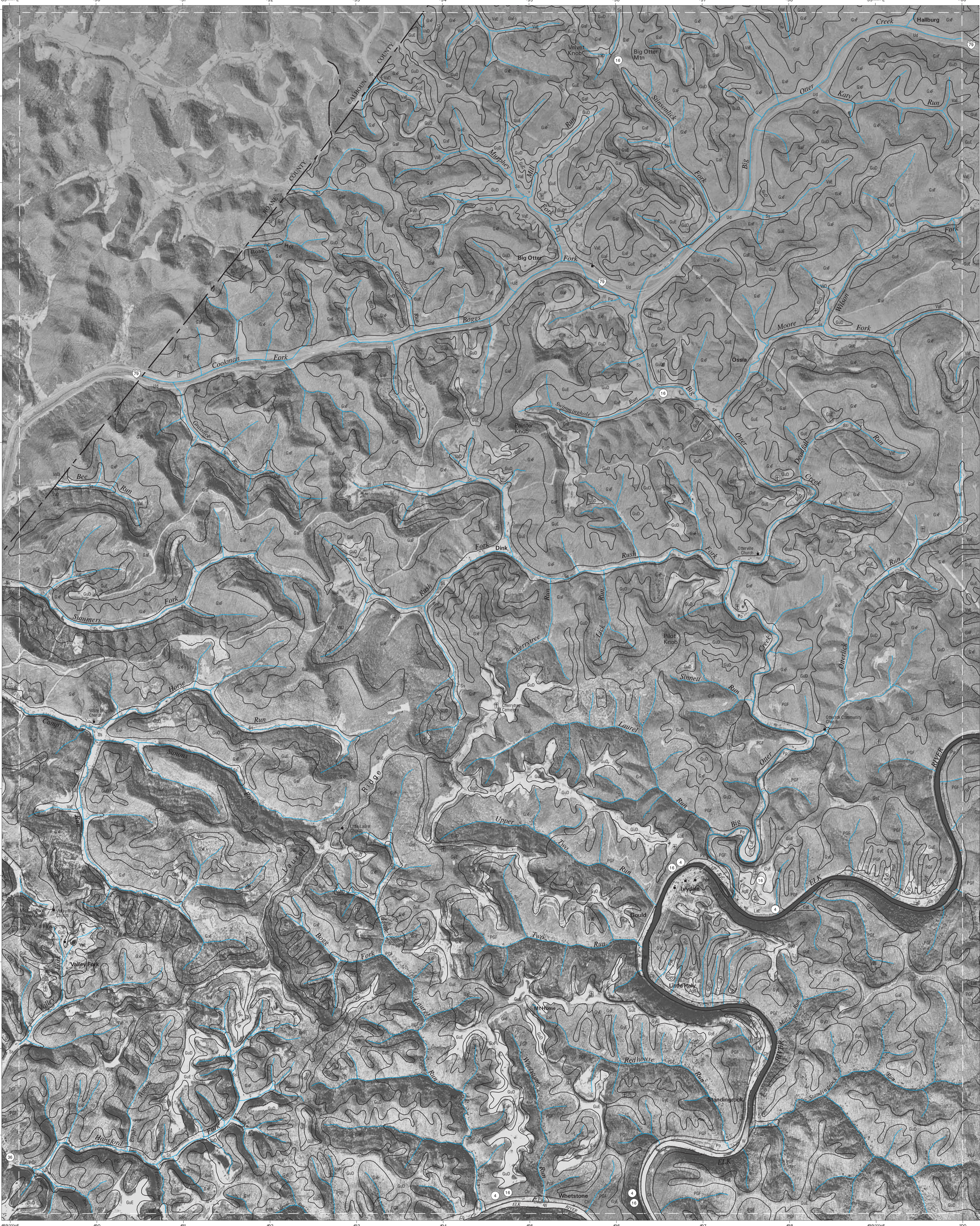
CLAY COUNTY, WEST VIRGINIA
IVYDALE QUADRANGLE
SHEET NUMBER 4 OF 13

Joins sheet 1, Chloe

Joins sheet 2, Rosedale

Joins sheet 3, Newton

Joins sheet 5, Strange Creek



Joins sheet 8, Elkhurst

Joins sheet 9, Clay

Joins sheet 10, Swandale

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QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1 CHLOE
2 ROSEDALE
3 NEWTON
5 STRANGE CREEK
8 ELKHURST
9 CLAY
10 SWANDALE

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IVYDALE, WEST VIRGINIA
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 13

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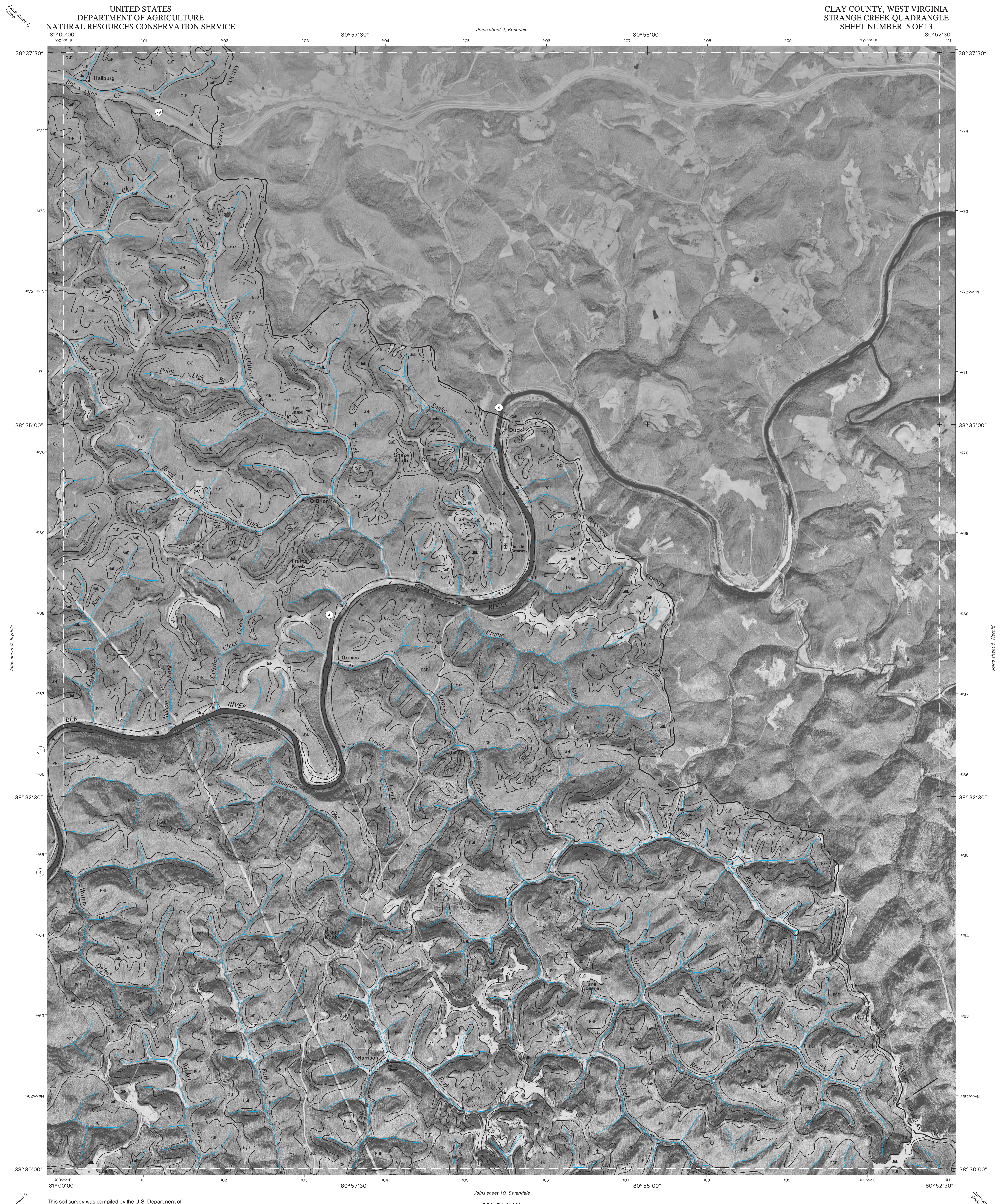
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
STRANGE CREEK QUADRANGLE
SHEET NUMBER 5 OF 13



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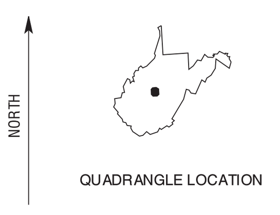

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	
4		6
9	10	11

1 CHLOE
2 ROSEDALE
4 IVYDALE
6 HEROLD
9 CLAY
10 SWANDALE
11 WIDEN

INDEX TO ADJOINING 7.5 MAPS

STRANGE CREEK, WEST VIRGINIA

7.5 MINUTE SERIES
SHEET NUMBER 5 OF 13

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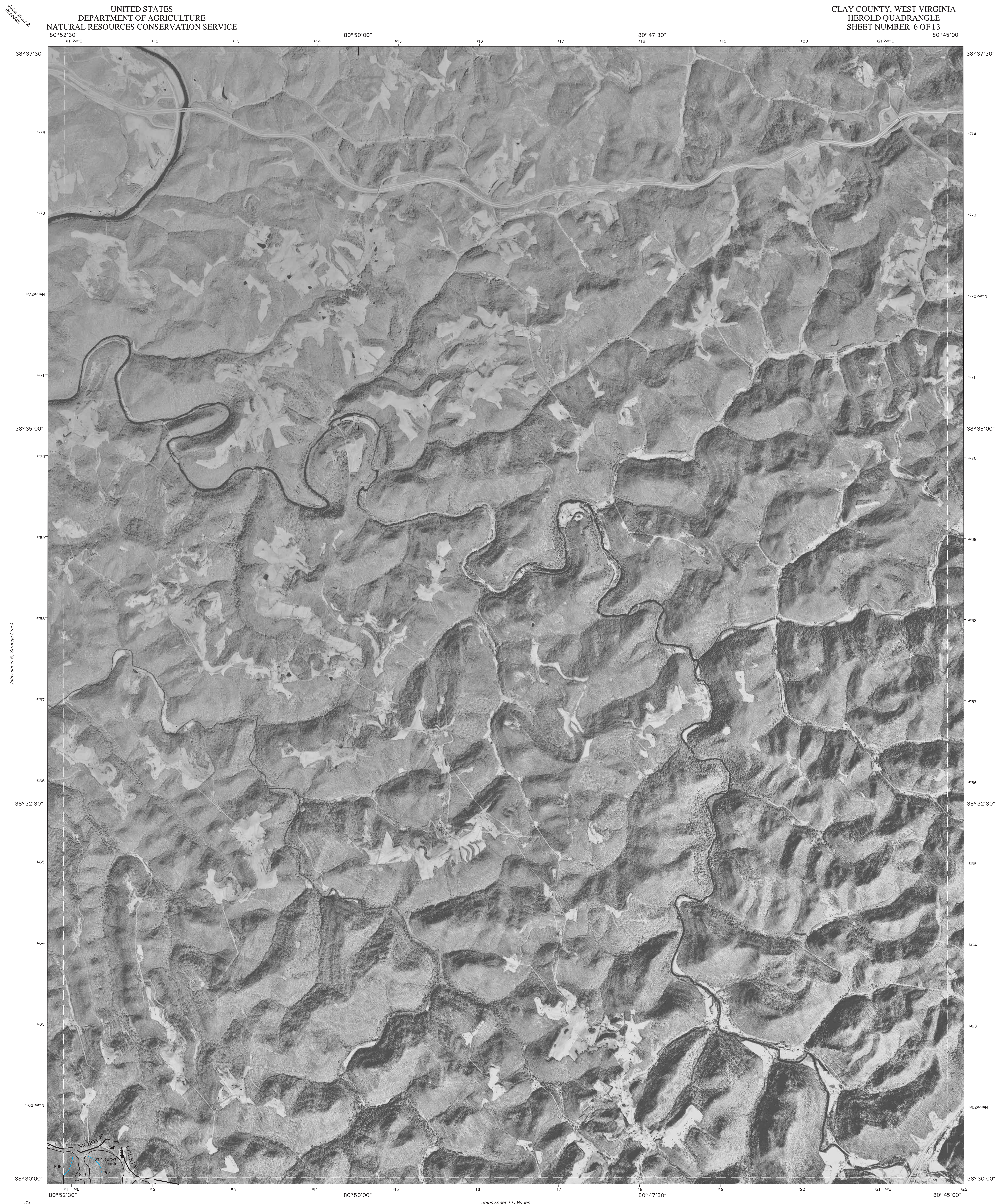
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
HEROLD QUADRANGLE
SHEET NUMBER 6 OF 13



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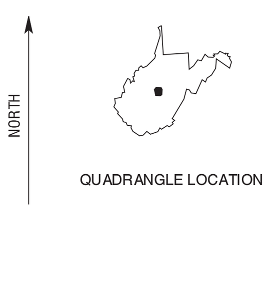
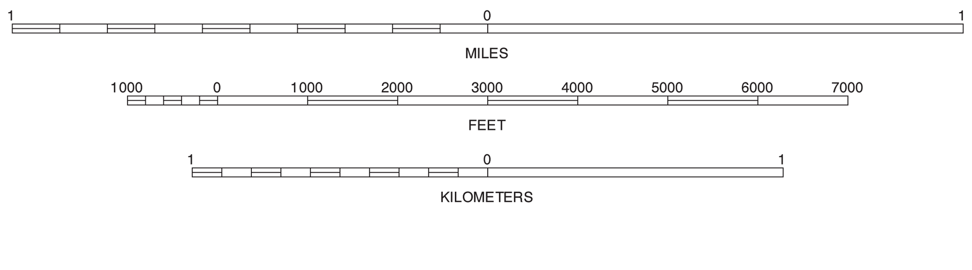
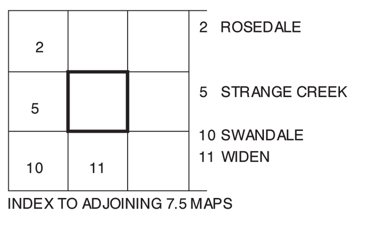


QUADRANGLE LOCATION

SCALE 1:24000





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HEROLD, WEST VIRGINIA
7.5 MINUTE SERIES
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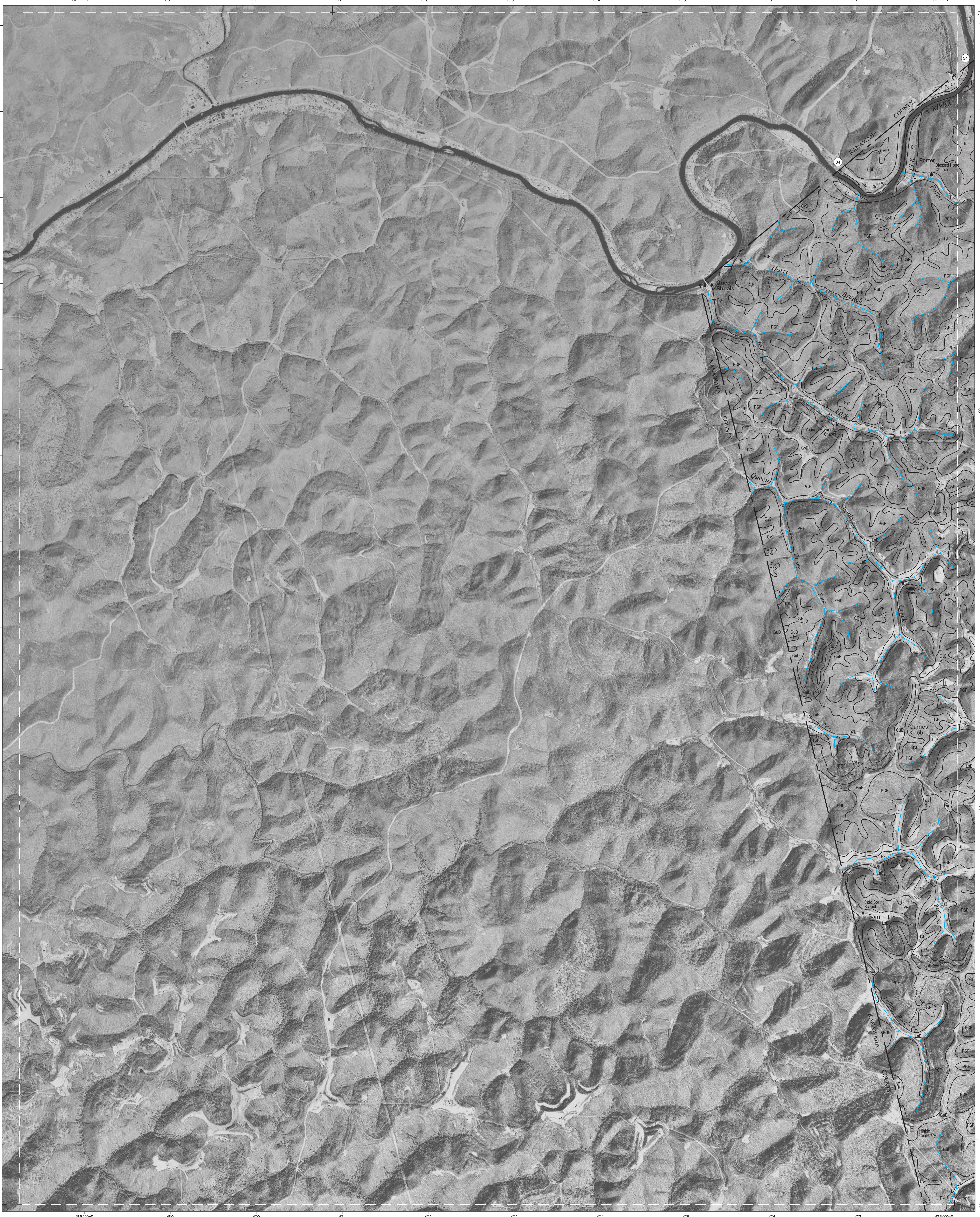
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
CLENDENIN QUADRANGLE
SHEET NUMBER 7 OF 13

Joins sheet 3, Newton

81° 22′30″ | 468000m E | 469 | 470 | 81° 20′00″ | 471 | 472 | 473 | 474 | 81° 17′30″ | 475 | 476 | 477 | 478000m E | 81° 15′00″

38° 30′00″



38° 27′30″

38° 25′00″

38° 22′30″

Joins sheet 8, Elkhurst

81° 22′30″ | 468000m E | 469 | 470 | 81° 20′00″ | 471 | 472 | 473 | 474 | 81° 17′30″ | 475 | 476 | 477 | 478000m E | 81° 15′00″

Joins sheet 12, Bentree

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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

3 NEWTON
8 ELKHURST
12 BENTREE

INDEX TO ADJOINING 7.5 MAPS

CLENDENIN, WEST VIRGINIA

7.5 MINUTE SERIES
SHEET NUMBER 7 OF 13

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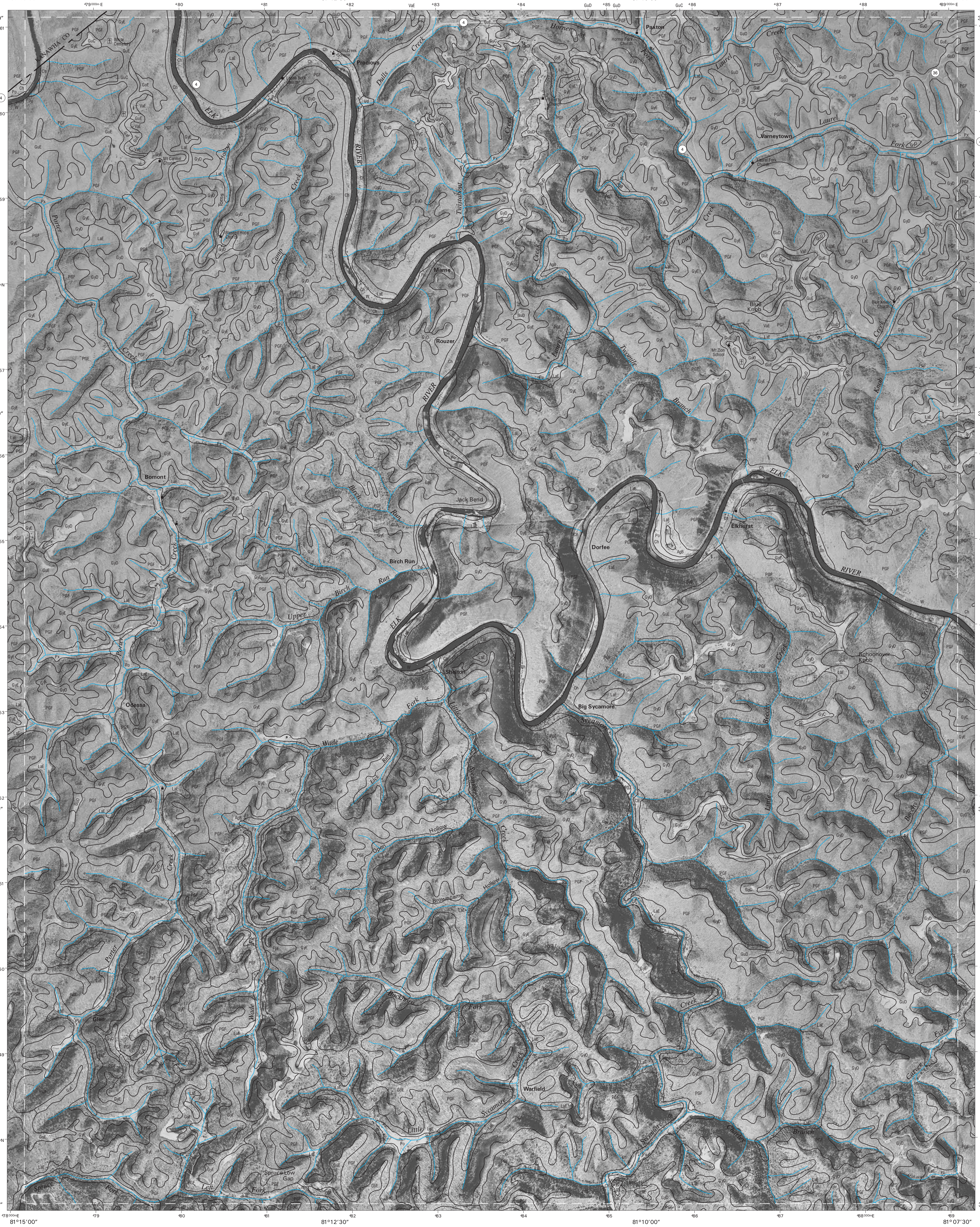
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
ELKHURST QUADRANGLE
SHEET NUMBER 8 OF 13



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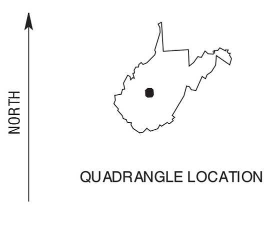

QUADRANGLE LOCATION

SCALE 1:24000

MILES: 1 0 1

FEET: 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS: 1 0 1

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3 NEWTON
4 IVYDALE
7 CLENDENIN
9 CLAY
12 BENTREE
13 LOCKWOOD

ELKHURST, WEST VIRGINIA
7.5 MINUTE SERIES
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
CLAY QUADRANGLE
SHEET NUMBER 9 OF 13

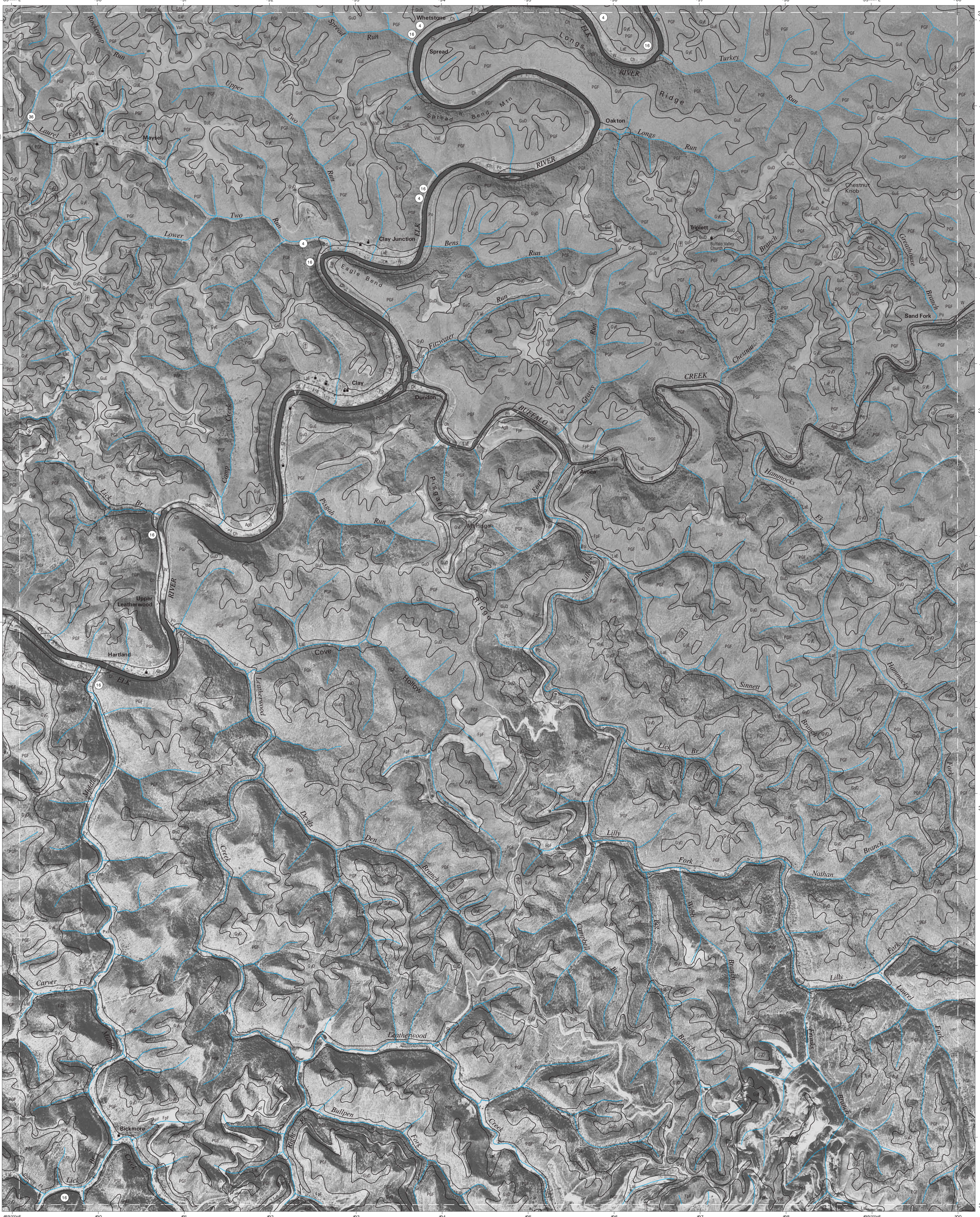
Joins sheet 3, Newton

Joins sheet 4, Ivydale

Joins sheet 5, Strange Creek

81° 07′30″ 81° 05′00″ 81° 02′30″ 81° 00′00″

38° 30′00″



38° 27′30″ 38° 25′00″ 38° 22′30″

Joins sheet 8, Elkhurst

Joins sheet 10, Swandale

Joins sheet 12, Bentree

Joins sheet 13, Lockwood

489 000m E 490 491 492 493 494 495 496 497 498 499 000m E 500

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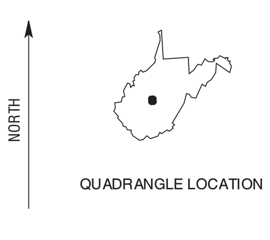

QUADRANGLE LOCATION

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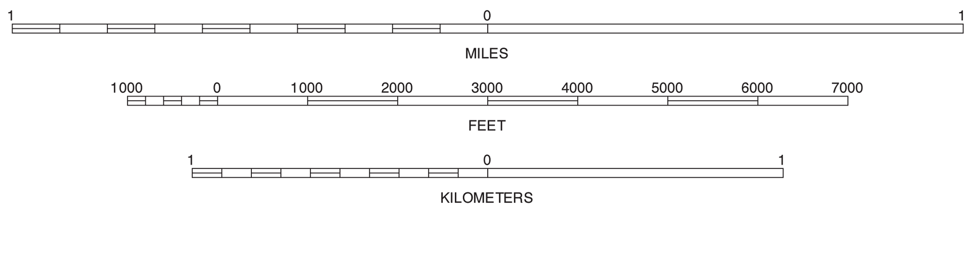

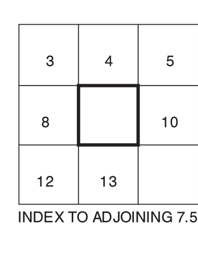

3 NEWTON
4 IVYDALE
5 STRANGE CREEK
8 ELKHURST
10 SWANDALE
12 BENTREE
13 LOCKWOOD

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CLAY, WEST VIRGINIA
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SHEET NUMBER 9 OF 13

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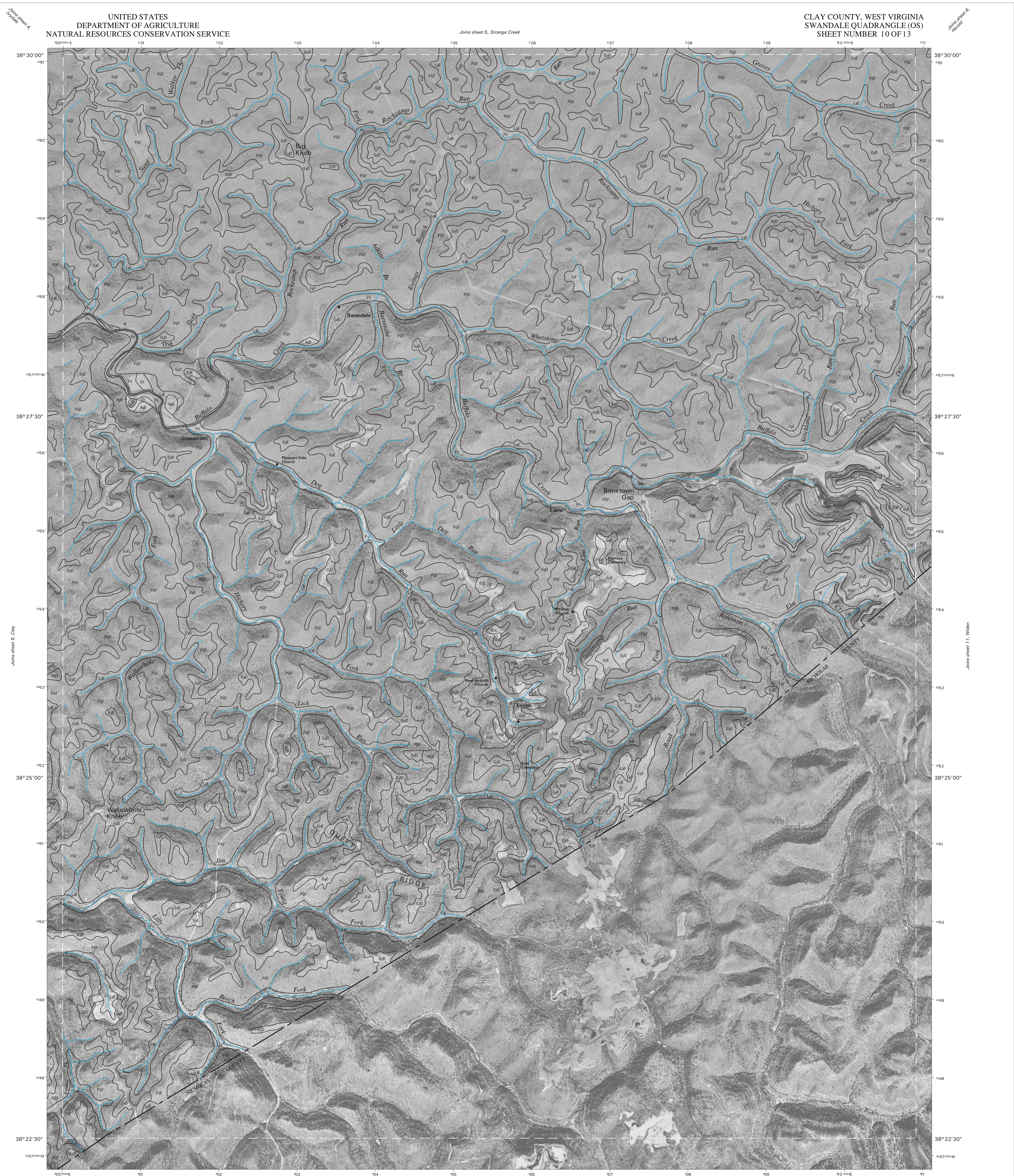
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
SWANDALE QUADRANGLE (OS)
SHEET NUMBER 10 OF 13



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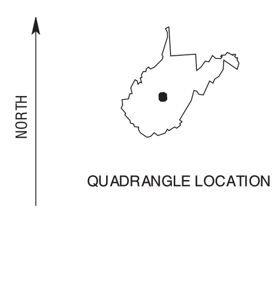

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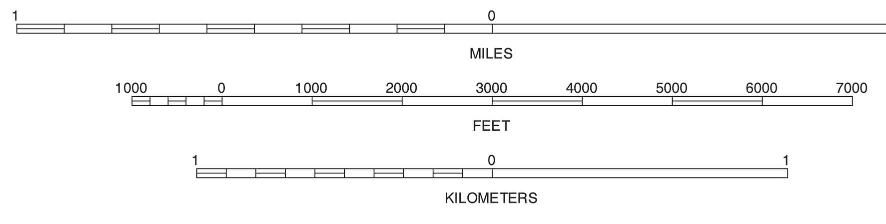

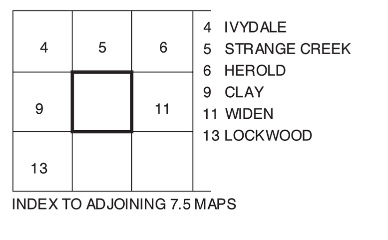

SWANDALE, (OS) WEST VIRGINIA
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 13

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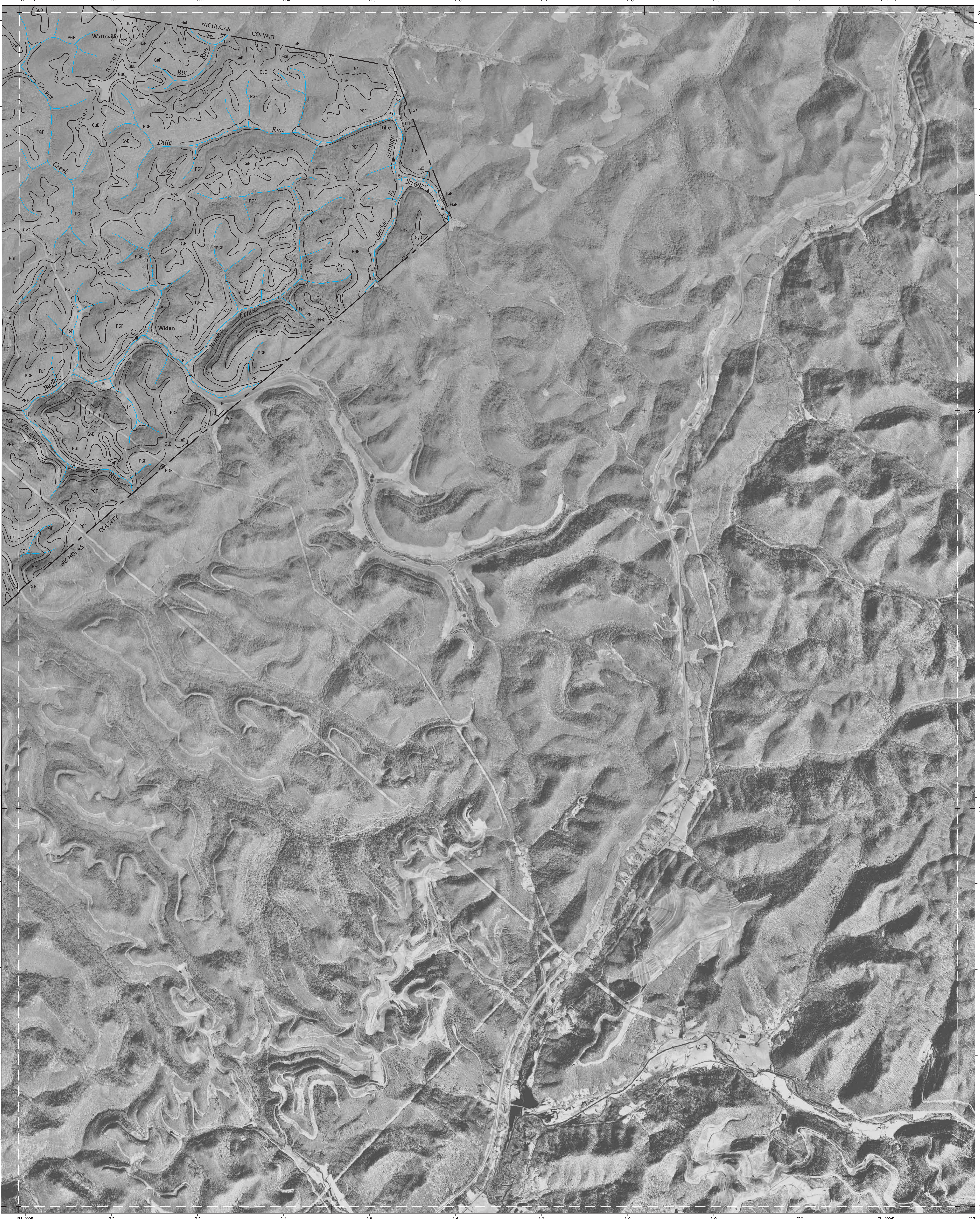
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
WIDEN QUADRANGLE
SHEET NUMBER 11 OF 13



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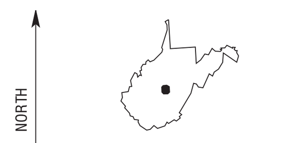
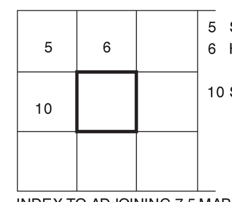


SCALE 1:24000

MILES

FEET

KILOMETERS



WIDEN, WEST VIRGINIA
7.5 MINUTE SERIES
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UNITED STATES
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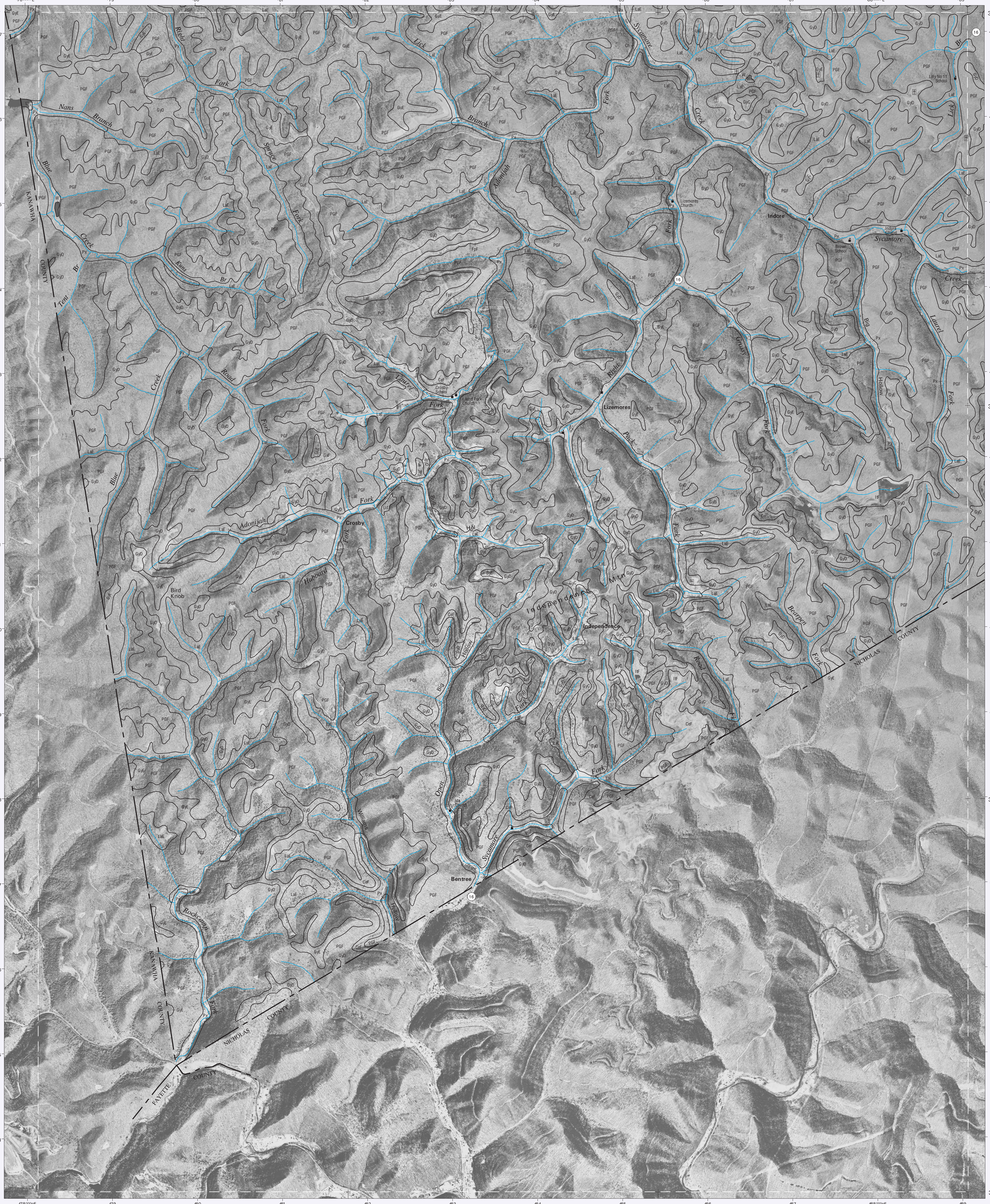
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
BENTREE QUADRANGLE (OS)
SHEET NUMBER 12 OF 13



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North American Datum of 1983 (NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 17. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

7 CLENDENIN
8 ELKHURST
9 CLAY
13 LOCKWOOD

INDEX TO ADJOINING 7.5 MAPS

BENTREE, (OS) WEST VIRGINIA
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 13

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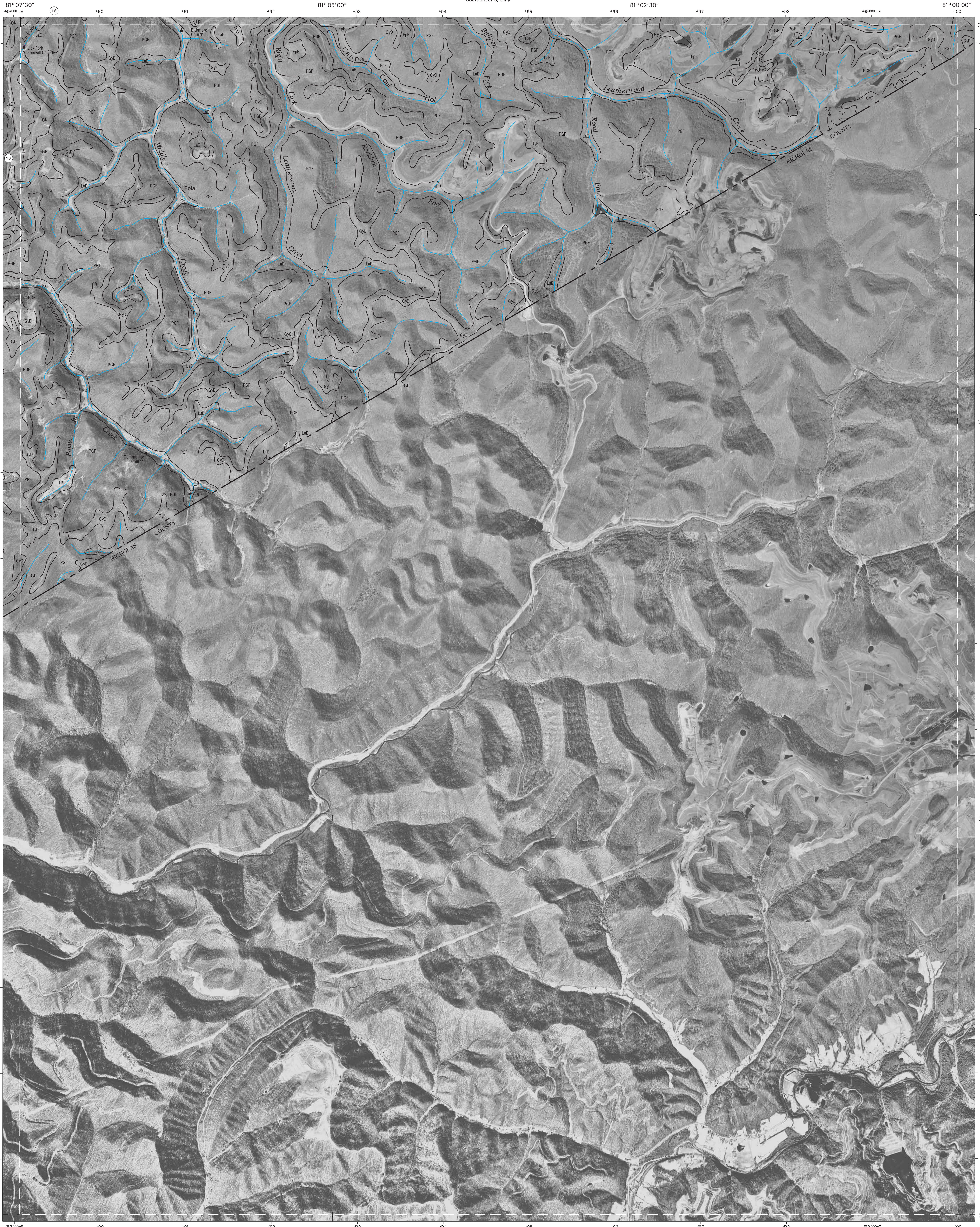
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, WEST VIRGINIA
LOCKWOOD QUADRANGLE
SHEET NUMBER 13 OF 13



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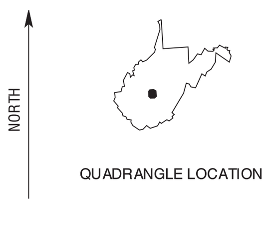
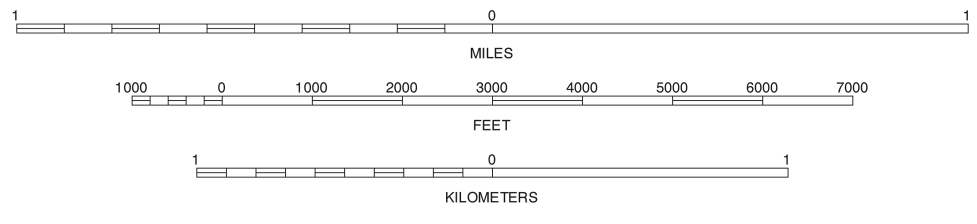
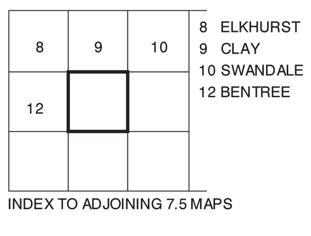


QUADRANGLE LOCATION

SCALE 1:24000





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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.